

المملكة العربية السعودية

وزارة التعليم

MINISTRY OF EDUCATION



لكل المهتمين و المهتمات
بدروس و مراجع الجامعية

هام

مدونة المناهج السعودية eduschool40.blog

3-3 المثلثات

The Sandwich Theorem:

(1)

1) $\lim_{x \rightarrow 0} x^2 \cos(x + \frac{1}{x}) = 0$ ($\lim_{x \rightarrow 0^+} \sqrt{x} \cos(\frac{\pi}{x^2}) = 0$

2) $\lim_{x \rightarrow 0} (x+5x^2) \sin(\frac{e}{x}) = 0$

Theorem:

1) $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ ($\lim_{x \rightarrow 0} \frac{\sin(nx)}{(nx)} = \frac{n}{m}$ ($\lim_{x \rightarrow a} \frac{\sin(x-a)}{(x-a)} = 1$

2) $\lim_{x \rightarrow 0} \frac{mx}{\sin(nx)} = \frac{m}{n}$ ($\lim_{x \rightarrow 0} \frac{\sin(nx)}{\sin(mx)} = \frac{n}{m}$

3) $\lim_{x \rightarrow 0} \frac{\tan x}{x} = 1$ ($\lim_{x \rightarrow 0} \frac{\tan(nx)}{(nx)} = \frac{n}{m}$

4) $\lim_{x \rightarrow 0} \frac{hx}{\tan(mx)} = \frac{n}{m}$ ($\lim_{x \rightarrow 0} \frac{\sin(nx)}{\tan(mx)} = \frac{n}{m}$ ($\lim_{x \rightarrow 0} \frac{\tan(nx)}{\tan mx} = \frac{n}{m}$

5) $\lim_{x \rightarrow 0} \frac{\sin^p x}{m x^p} = (\lim_{x \rightarrow 0} \frac{\sin x}{m x})^p = (\frac{n}{m})^p$

6) $\lim_{x \rightarrow 0} \frac{\tan^p nx}{m x^p} = (\frac{n}{m})^p$

7) $\lim_{x \rightarrow 0} x \tan \frac{1}{x} = 1$ ($\lim_{x \rightarrow 0} x \sin \frac{1}{x} = 0$)
 (by separation)
 Notes: $\cos \cos = 1$, \cos $\frac{1}{x}$ $\rightarrow 0$

8) $\lim_{x \rightarrow 0} (\frac{\cos x}{3} + 2x^2 - \frac{x}{\tan x}) = \frac{1}{3} + 0 - 1 = -\frac{2}{3}$

9) $\lim_{x \rightarrow 0} \frac{\sin(1-\cos x)}{(1-\cos x)} = 1$ ($\lim_{x \rightarrow 0} \frac{\sin(\sin x)}{\sin 2x} = 1$)
 Notes: $\sin^2 = 1 - \cos^2$

1) $\lim_{x \rightarrow 0} \frac{1 - \cos^2 x}{1 - \cos x} = 2$ ($\lim_{x \rightarrow \frac{\pi}{2}} \frac{1 - \sin^2 x}{1 - \sin x} = 2$ ($\lim_{x \rightarrow \frac{\pi}{4}} \frac{1 - \tan^2 x}{1 - \tan x} = 2$

2) $\lim_{x \rightarrow 0} \frac{1 - \sin^2 x}{1 - \sin x} = 1$ ($\lim_{x \rightarrow 0} \frac{1 - \tan^2 x}{1 - \tan x} = 1$

3) $\lim_{x \rightarrow 0} \frac{\sin^2 4x}{\sin^2 x} = (\lim_{x \rightarrow 0} \frac{\sin 4x}{\sin x})^2 = (4)^2 = 16$ ($\lim_{x \rightarrow 0} \frac{\sin(x^3)}{x^3} = 1$

4) $\lim_{x \rightarrow 0} \frac{\sin x^2}{x} = 0$ (L.H) $\lim_{x \rightarrow 0} (2x)(\cos x^2) = (0)(1) = 0$

Note:

(3.3) ملاحظات

(2)

1) $\lim_{x \rightarrow 0} \sin\left(\frac{1}{x}\right) = \sin(\infty) \rightarrow D.N.E \rightarrow \therefore \sin(\pm\infty) = D.N.E$

$\lim_{x \rightarrow 0} \cos\left(\frac{1}{x}\right) = \cos(\infty) \rightarrow D.N.E \rightarrow \therefore \cos(\pm\infty) = D.N.E$

$\frac{n}{\infty} = 0$

2) $\lim_{x \rightarrow \infty} \frac{\sin x}{x} = 0$

$\lim_{x \rightarrow \infty} \frac{\cos x}{x} = 0$

(by squeeze theorem)

3) $\lim_{x \rightarrow \infty} \sin\left(\frac{1}{x}\right) = \sin(0) = 0$ ($\lim_{x \rightarrow \infty} \cos\left(\frac{1}{x}\right) = \cos(0) = 1$)

4) $\lim_{x \rightarrow \infty} \frac{\sin^2 x}{x^2} = \left(\lim_{x \rightarrow \infty} \frac{\sin x}{x}\right)^2 = 0$ ($\lim_{x \rightarrow \infty} \frac{\cos^2 x}{x^2} = 0$)

5) $\lim_{x \rightarrow \infty} x \tan \frac{1}{x} = 1$ ($\lim_{x \rightarrow \infty} x \sin \frac{1}{x} = 1$) (let $t = \frac{1}{x}$, $x = \frac{1}{t}$)

6) $\lim_{x \rightarrow 0} x \cot x = (0 \cdot \infty) \Rightarrow \lim_{x \rightarrow 0} \frac{x}{\tan x} = 1$

$\lim_{x \rightarrow 0} x \csc x = \lim_{x \rightarrow 0} \frac{x}{\sin x} = 1$

7) $\lim_{x \rightarrow (2\pi)^-} x \csc x = \lim_{x \rightarrow (2\pi)^-} \frac{x}{\sin x} = \frac{2\pi}{0} = -\infty$

$\lim_{x \rightarrow (\pi)^-} \csc x = \lim_{x \rightarrow (\pi)^-} \frac{1}{\sin x} = \frac{1}{0^+} = \infty$

$\lim_{x \rightarrow (-\frac{\pi}{2})^+} \sec x = \lim_{x \rightarrow (-\frac{\pi}{2})^+} \frac{1}{\cos x} = \frac{1}{0} = -\infty$

$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$

$\lim_{x \rightarrow \infty} \frac{\sin x}{x} = 0$

$\lim_{x \rightarrow 0} x \sin \frac{1}{x} = 0$

(4)
شرح استخدام طريقة (L.H)

$$\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \frac{0}{0} \xrightarrow{\text{L.H}} \lim_{x \rightarrow a} \frac{f'(x)}{g'(x)}$$

(بتوضيح مباشر) (بالاشتقاق)

↑
(بالاشتقاق)

Ex: Evaluate the limit, if it exists. (التوضيح المباشر أولاً دائماً)

1) $\lim_{t \rightarrow 0} \left(\frac{1}{t} - \frac{1}{t^2+t} \right) = \frac{1}{0} - \frac{1}{0} = (\infty - \infty) = \lim_{t \rightarrow 0} \left(\frac{1}{t} - \frac{1}{t(t+1)} \right)$
 = $\lim_{t \rightarrow 0} \left(\frac{(t+1) - 1}{t(t+1)} \right) = \lim_{t \rightarrow 0} \frac{t}{t(t+1)} = \lim_{t \rightarrow 0} \frac{1}{t+1} = 1$

2) $\lim_{x \rightarrow -1} \frac{2x^2+3x+1}{x^2-2x-3} = \frac{0}{0} \lim_{x \rightarrow -1} \frac{(2x+1)(x+1)}{(x-3)(x+1)} = \lim_{x \rightarrow -1} \frac{2x+1}{x-3} = \frac{-1}{-4} = \frac{1}{4}$

3) $\lim_{x \rightarrow -2} \frac{x+2}{x^3+8} = \frac{0}{0} \lim_{x \rightarrow -2} \frac{(x+2)}{(x+2)(x^2-2x+4)} = \frac{1}{12}$

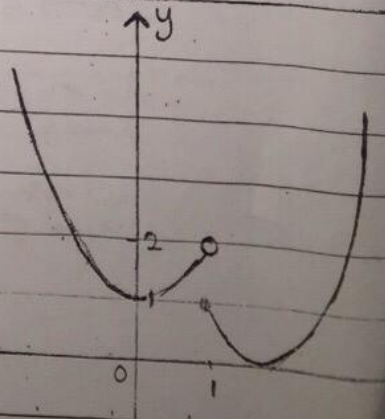
4) $\lim_{x \rightarrow 2} \frac{\sqrt{2x^2+1}}{\sqrt{3x-2}} = \frac{\sqrt{2(2)^2+1}}{\sqrt{3(2)-2}} = \frac{\sqrt{9}}{\sqrt{4}} = \frac{3}{2}$ (توضيح مباشر)

5) $\lim_{x \rightarrow 2} \frac{\sqrt{6-x} - 2}{\sqrt{3-x} - 1} = \frac{0}{0} \rightarrow \lim_{x \rightarrow 2} \frac{\sqrt{3-x} + 1}{\sqrt{6-x} + 2} = \frac{2}{4} = \frac{1}{2}$

6) $\lim_{x \rightarrow -2} (3x^2+ax+a+3) = 0$, then $a = \dots \Leftrightarrow$ (بتوضيح مباشر)
 $3(-2)^2 + a(-2) + a + 3 = 0 \rightarrow -2a + a = -15 \Rightarrow \therefore a = 15$

7) $f(x) = \begin{cases} x^2+1 & \text{if } x < 1 \\ (x-2)^2 & \text{if } x \geq 1 \end{cases}$

$\lim_{x \rightarrow 1^-} (x^2+1) = 2$
 $\lim_{x \rightarrow 1^+} (x-2)^2 = 1$
 $\therefore \lim_{x \rightarrow 1} f(x) = \text{D.N.E}$



8) $\lim_{x \rightarrow 3} \frac{x^2 - 3x - 1}{|x - 4|} = \frac{9 - 9 - 1}{|1 - 1|} = \frac{-1}{1} = -1$ (تعوين مباشر)

$D_f = \mathbb{R} - \{4\}, x = 3 \in D_f$

9) $\lim_{x \rightarrow 4} \frac{4 - x}{2 - \sqrt{x}} = \frac{0}{0} \lim_{x \rightarrow 4} \frac{(2 - \sqrt{x})(2 + \sqrt{x})}{(2 - \sqrt{x})}$
 $= \lim_{x \rightarrow 4} (2 + \sqrt{x}) = 2 + \sqrt{4} = 2 + 2 = 4$

10) If $\lim_{x \rightarrow a^-} f(x) = -\infty$ and $\lim_{x \rightarrow a^+} f(x) = \infty$, then $\lim_{x \rightarrow a} f(x) = D.N.E$

EX: Evaluate the limit :

1) $\lim_{x \rightarrow 2} (3x^2 + x - 4) = 3(2)^2 + 2 - 4 = 10$ كثرة عدد ← تعوین مباشر
 $D = \mathbb{R}$

2) $\lim_{x \rightarrow 2} \frac{x^3 + 5}{x^2 + 1} = \frac{(2)^3 + 5}{(2)^2 + 1} = \frac{8 + 5}{4 + 1} = \frac{13}{5}$ بالعكس تعوین مباشر أولاً
(D = ℝ مجموع مرتبة)

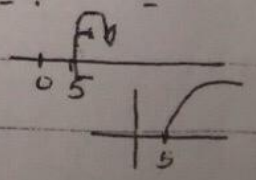
3) $\lim_{x \rightarrow -1} \sqrt{x^3 + 6} = \sqrt{-1 + 6} = \sqrt{5}$ مبدأ ترتيبين وندرس الأيه عند
x ← -1 أي ليس عند 0 ← تعوین مباشر

4) $\lim_{x \rightarrow -1} \frac{1}{x - 1} = \frac{1}{-1 - 1} = -\frac{1}{2}$ التعوین المباشر (D = ℝ - {1})
(x = 1) ليس ضمن المقام

5) $\lim_{x \rightarrow 5} \sqrt{x - 5} = D.N.E$ نحدد المجال أولاً: $D_f = [5, \infty)$
(الدالة معرفة على قيمة 5)

$\therefore \lim_{x \rightarrow 5^+} \sqrt{x - 5} = 0$ ندرس الأيه من الكمية
($\lim_{x \rightarrow 9} \sqrt{x - 5} = \sqrt{4} = 2$)

$\lim_{x \rightarrow 5^-} \sqrt{x - 5} = D.N.E$ ($\lim_{x \rightarrow -4} \sqrt{x - 5} = D.N.E$)



(2.3) 108

57) $\lim_{x \rightarrow 1} \frac{f(x) - 8}{x - 1} = 10$ find $\lim_{x \rightarrow 1} f(x)$ (13)

$$\rightarrow f(x) - 8 = 10(x - 1) \Rightarrow f(x) - 8 = 10x - 10$$

$$\Rightarrow f(x) = 10x - 10 + 8 \Rightarrow f(x) = 10x - 2$$

$$\therefore \lim_{x \rightarrow 1} f(x) = \lim_{x \rightarrow 1} (10x - 2) = 10 - 2 = 8$$

58) If $\lim_{x \rightarrow 0} \frac{f(x)}{x^2} = 5$ find a) $\lim_{x \rightarrow 0} f(x)$ b) $\lim_{x \rightarrow 0} \frac{f(x)}{x}$

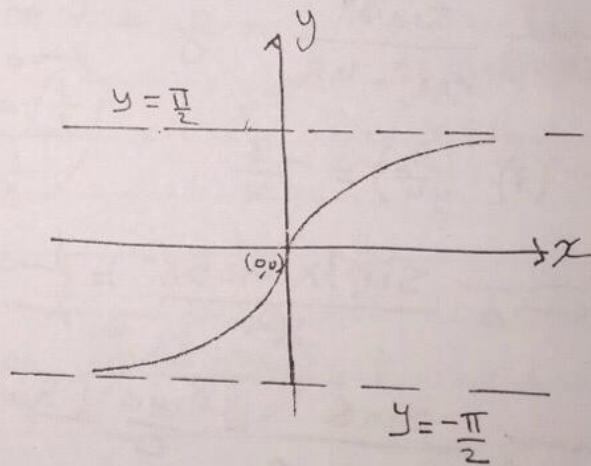
a) $\lim_{x \rightarrow 0} f(x) = 5 \lim_{x \rightarrow 0} x^2 = 5(0) = 0$

b) $\lim_{x \rightarrow 0} \frac{f(x)}{x} = 0 \rightarrow \lim_{x \rightarrow 0} f(x) = \lim_{x \rightarrow 0} x = 0$

Note: 132

1) $\lim_{x \rightarrow -\infty} \tan^{-1} x = -\frac{\pi}{2}$

2) $\lim_{x \rightarrow \infty} \tan^{-1} x = \frac{\pi}{2}$



EX: التالي: Find (H.A)

1) $\lim_{x \rightarrow \infty} \frac{2}{\tan^{-1} x} = \frac{2}{\tan^{-1}(\infty)} = \frac{2}{\frac{\pi}{2}} = \frac{4}{\pi}$

2) $\lim_{x \rightarrow -\infty} \frac{2}{\tan^{-1} x} = \frac{2}{\tan^{-1}(-\infty)} = \frac{2}{-\frac{\pi}{2}} = -\frac{4}{\pi}$

$$\lim_{x \rightarrow -\infty} \frac{e^{-x} + 2}{x^2 + 1} = \frac{\infty}{\infty} \quad \text{نویس ما سرت}$$

$$\xrightarrow{\text{L.H}} \lim_{x \rightarrow -\infty} \frac{-e^{-x}}{2x} = \frac{-\infty}{\infty}$$

$$\xrightarrow{\text{L.H}} \lim_{x \rightarrow -\infty} \frac{e^{-x}}{2} = \infty$$

$$\boxed{e^{-(\infty)} = e^{\infty} = \infty}$$

□

(Chapter 2.7) Derivatives & Rate of change

Def: 143

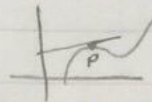
The tangent line to the curve $y=f(x)$ at the point $P(a, f(a))$ is the line through P with slope

(ميل الخط)

[1]

$$m = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$$

provided that this limit exists



Def: 144

let $h = (x - a) \rightarrow \therefore x = (a + h)$

نستبدل في التعريف السابق
نحصل على الصيغة الجديدة للميل

[2]

(ميل الخط):

$$m = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$$

(slope of the tangent line)

Def: 145

The derivative of a function f at a number a (denoted by $f'(a)$), is

[3]

$$f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$$

if this limit exists.

\therefore صيغة إيجاد ميل الخط m رقم [2] = صيغة المشتقة الأولى رقم [3] عند العدد a

Def: 146

let $h = (x - a) \rightarrow \therefore x = (a + h)$ (\therefore the derivative of f)

[4]

$$f'(a) = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$$

\therefore صيغة إيجاد ميل الخط m رقم [1] = صيغة المشتقة الأولى رقم [4]

Def: How to the equation of the tangent line:

1) Find the slope $m = f'(x)$

(1) إيجاد ميل الخط $f'(x)$

2) use (x_0, y_0) to find value of m at $x = a$

(2) إيجاد نقطة (x_0, y_0) على الخط

(3) معادلة الخط المستقيم

3) $(y - y_0) = m(x - x_0) \Rightarrow \therefore y = mx + b$ ①

خط مستقيم معطى

or $AX + BY + C = 0$ ②

المستقيم معطى

① أو ②

Chapter (2.7)

Ex 1 144Find an equation of the tangent line of $f(x) = x^2$, $P(1, 1)$

$$1) f'(x) = 2x \rightarrow \therefore m = f'(x)|_{x=1} = 2(1) = 2 \quad (\text{الميل})$$

2) The equation of the tangent line:

$$(y - y_0) = m(x - x_0) \Rightarrow (y - 1) = 2(x - 1)$$

$$\Rightarrow y - 1 = 2x - 2 \Rightarrow y = 2x - 1$$

Ex 2: Find an equation of the tangent line of $f(x) = \frac{3}{x}$, $P(3, 1)$

$$1) f'(x) = \frac{(-1)(3)}{x^2} = \frac{-3}{x^2} = m \quad \text{الميل}$$

$$\therefore m = f'(x)|_{x=3} = \frac{-3}{9} = -\frac{1}{3}$$

$$2) (y - y_0) = m(x - x_0) \Rightarrow (y - 1) = -\frac{1}{3}(x - 3)$$

$$\Rightarrow y - 1 = -\frac{1}{3}x + 1 \Rightarrow y = -\frac{1}{3}x + 2 \quad (\text{المضرب في 3})$$

$$\rightarrow 3y = -x + 6 \Rightarrow \therefore x + 3y - 6 = 0 \xrightarrow{\text{صورة}} Ax + By + C = 0$$

Ex 4: 146 $f(x) = x^2 - 8x + 9$, Find $f'(a)$ (استخدام التفاضل) / قسم (3)

$$f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h} = \lim_{h \rightarrow 0} \frac{[(a+h)^2 - 8(a+h) + 9] - [a^2 - 8a + 9]}{h}$$

Ex 5: Find an equation of the tangent line, $f(x) = x^2 - 8x + 9$ at $(3, -6)$

$$1) f'(x) = 2x - 8 |_{x=3} = 2(3) - 8 = -2 = m \quad (\text{الميل}) \text{ slope}$$

$$2) (y - y_0) = m(x - x_0) \Rightarrow (y + 6) = -2(x - 3)$$

$$\Rightarrow y + 6 = -2x + 6 \Rightarrow y = -2x$$

(chapter 2.8) The Derivative as a function

Def 1:

The derivative of a function f at a number a :

$$f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h} \quad (1)$$

Def 2:

The derivative of a function f for variable x :

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} \quad (2)$$

Ex: 156 IF $f(x) = \sqrt{x}$, find f' , D_f & D_f^-

$$1) f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \rightarrow 0} \frac{\sqrt{x+h} - \sqrt{x}}{h}$$

$$2) D_f = [0, \infty) \quad / \quad D_f^- = (0, \infty) \quad f(x) = \frac{1}{2\sqrt{x}} \quad (\text{استخدام القانون})$$

Ex: $f(x) = \frac{1-x}{2+x}$ Find $f'(x)$ (با استخدام القسمة)

$$1) f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \rightarrow 0} \left[\frac{\frac{1-(x+h)}{2+(x+h)} - \frac{1-x}{2+x}}{h} \right]$$

$$2) f'(x) = \frac{(-1)(2+x) - (1)(1-x)}{(2+x)^2} = \frac{-2-x-1+x}{(2+x)^2} = \frac{-3}{(2+x)^2}$$

* Other Notations:

$$1) f'(x) = y' = \frac{dy}{dx} = \frac{df}{dx} = \frac{d}{dx} f(x) = Df(x) = D_x f(x)$$

* Higher Derivatives:

$$2) f''(x) = y'' = \frac{d^2y}{dx^2} = \frac{d}{dx} \left(\frac{dy}{dx} \right) \dots$$

$$3) y^{(n)} = f^{(n)}(x) = \frac{d^n y}{dx^n}$$

$$4) \left. \frac{dy}{dx} \right|_{x=a} \quad (\text{اى النقطة بيها } x)$$

* The tangent line to $y=f(x)$ at $(a, f(a))$ is the line through $(a, f(a))$ whose slope is equal to $f'(a)$, the derivative of f at a

نقطة $(a, f(a))$ هي النقطة التي

$$(y - f(a)) = f'(a)(x - a)$$

الخط المماس للحاصل $f(x)$ عند النقطة $(a, f(a))$ ويكون $m = f'(a)$ هي المشتقة الأولى لـ f عند النقطة a

EX5: 157

where is the function $f(x) = |x|$ differentiable?

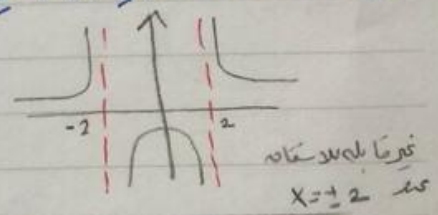
- 1) f is not diff. at $x=0$ (منه المعيار)
- 2) f is diff. at $x>0$ and $x<0 \rightarrow$ or $\mathbb{R} - \{0\}$

3) $f'(x) = \begin{cases} 1 & \text{if } x > 0 \\ -1 & \text{if } x < 0 \end{cases} \Rightarrow \therefore \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \text{D.V.E}$

استخدام التعريف $f(x)$

Note:

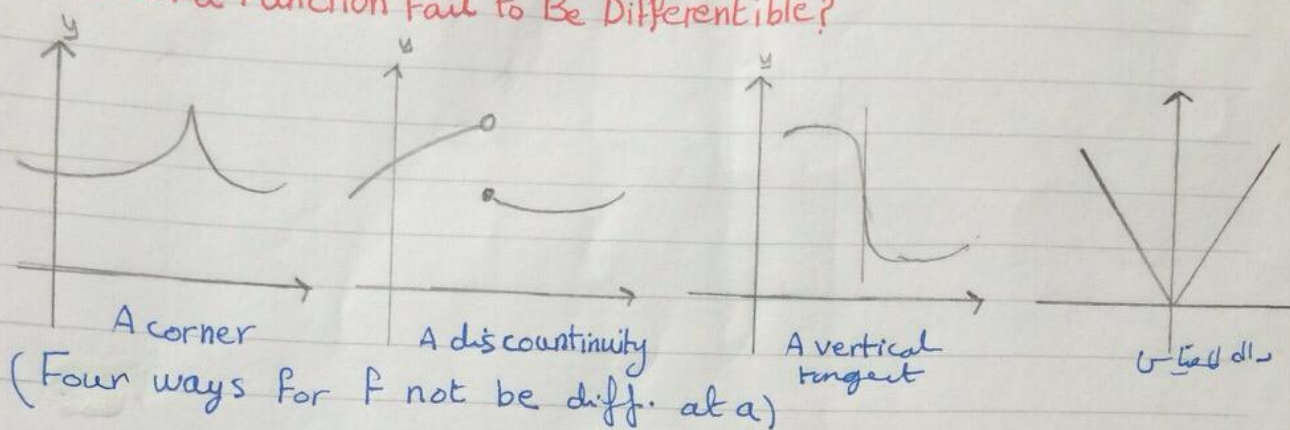
- 1) $|x \pm a| \rightarrow$ is not diff. at $x = \pm a$ (غير قابل للاشتقاق عند صفر المعيار)
- 2) $\sqrt{x \pm a} \rightarrow$ is not diff. at $x = \pm a$ (غير قابل للاشتقاق عند صفر الجذر)
- 3) $y = \frac{f(x)}{g(x)}$ rational fun. \rightarrow not diff. at $x = \pm a$ (V.A) (غير قابل للاشتقاق عند صفر المقام)
- 4) slope of (V. Line) = undifinal (على أي خط رأسي غير صفر \rightarrow غير قابل للاشتقاق عند أي خط رأسي)
- 5) slope of (H. Line) = 0
- 6) $(a, b) \subseteq [a, b] \rightarrow D_f \subseteq D_f$



Theorem: 158

IF f is differentiable at a , then f is continuous at a .
والعكس غير صحيح مثال: $f(x) = \begin{cases} x \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$ $a = x$ و f غير قابل للاشتقاق عند نقطة الانكسار (صفر المعيار).

How Can a Function Fail to Be Differentiable?



Ex 7: ١٦١

If $f(x) = x^3 - x$, Find $f'(x)$ and $f^{(4)}(x)$

1) $f'(x) = 3x^2 - 1$

2) $f''(x) = 6x$

3) $f'''(x) = 6$

$\rightarrow \therefore f^{(4)} = 0$

إذا كانت درجة الدالة f هي n
وطلب المشتقة $(n+1)$ للدالة
 \therefore الناتج $= 0$

Ex: Find the equation of the tangent line and normal line to the curve $y = x\sqrt{x}$ at $P(1,1)$.

صوب (3.1)

1) The equation of the tangent line at $(1,1)$:

a) $f(x) = \sqrt{x} + \frac{x}{2\sqrt{x}} \Rightarrow f'(x) \Big|_{x=1} = 1 + \frac{1}{2} = \frac{3}{2} = m_1$ دالة

b) $(y-1) = \frac{3}{2}(x-1) \Rightarrow y = \frac{3}{2}x - \frac{3}{2} + 1 \Rightarrow \boxed{y = \frac{3}{2}x - \frac{1}{2}}$ (معادلة الخط المماس)

2) The equation of normal line at $(1,1)$:

a) $\therefore m_1 = \frac{3}{2} \rightarrow \therefore m_2 = -\frac{2}{3}$ (مائل الخط العمودي)

b) $(y - y_0) = m_2 (X - X_0) \Rightarrow (y - 1) = -\frac{2}{3} (X - 1) \Rightarrow$

$y - 1 = -\frac{2}{3}X + \frac{2}{3} \Rightarrow y = -\frac{2}{3}X + \frac{5}{3}$ (معادلة العمودي)

Ex: Find the points on the curve $y = x^4 - 6x^2 + 4$ where the tangent is horizontal

أي قيمة x تكون $f'(x) = 0$ أي
where the slope $f'(x) = m = 0$

$$1) y = x^4 - 6x^2 + 4$$

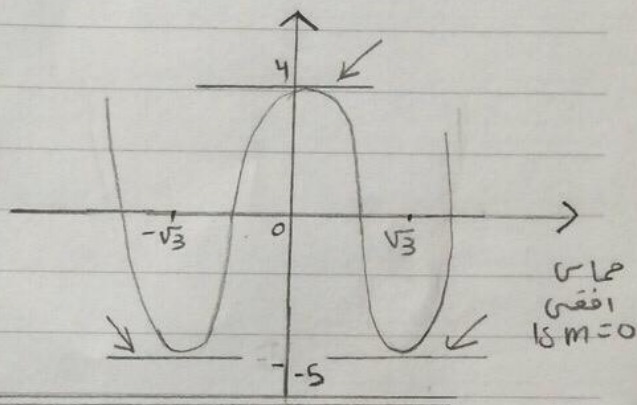
$$y' = 4x^3 - 12x = 0 \quad (\text{المشتق الأول}) \Rightarrow 4x(x^2 - 3) = 0 \Rightarrow$$

$$4x(x - \sqrt{3})(x + \sqrt{3}) = 0 \Rightarrow \therefore x = 0, x = \pm\sqrt{3}$$

$$2) \text{ at } x = 0 \rightarrow y = 4 \rightarrow \therefore (0, 4)$$

$$x = \sqrt{3} \rightarrow y = -5 \rightarrow (\sqrt{3}, -5)$$

$$x = -\sqrt{3} \rightarrow y = -5 \rightarrow (-\sqrt{3}, -5)$$



← ٣٢ من ١٠١



Second Exam STAT 110 Second Semester 1437-1438

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How many different ways can 5 basketball players and 4 football players be selected from 7 basketball players and 6 football players?

- 36
- 907,200
- 0.441
- 315

صفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 9 | 8 | 7 | 6 | 5 |
| 14 | 13 | 12 | 11 | 10 |
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |



متصفح الأسئلة

السؤال التالي <

> السؤال السابق

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مصادر المذاكرة خطة ب ~ KAU
05.08.17 الساعة 7:53 م



جامعة الملك عبد العزيز
الاختبارات الإلكترونية

الوقت المتبقي: 01:52:43

1779017 | تسجيل الدخول: 5 | 02/20

Second Exam STAT 110 Second Semester 1437-1438

13 of 32

The table below represents a selection of snacks purchased at a cinema according to gender:

| | Hot dog | Peanuts | Popcorn | Total |
|-------|---------|---------|---------|-------|
| Men | 5 | 7 | 6 | 18 |
| Women | 4 | 3 | 5 | 12 |
| Total | 9 | 10 | 11 | 30 |

If a customer is selected, find the probability that the customer is a woman or purchased peanuts

0.73
 0.1
 0.3
 0.63

صفحة الأسئلة

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|----|----|----|----|----|
| 9 | 8 | 7 | 6 | 5 |
| 14 | 13 | 12 | 11 | 10 |
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |

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The table below represents the college degrees awarded in a recent academic year according to gender:

| | Bachelor | Master | Doctorate | Total |
|-------|----------|--------|-----------|-------|
| Men | 4 | 8 | 4 | 16 |
| Women | 3 | 4 | 2 | 9 |
| Total | 7 | 12 | 6 | 25 |

If a person is selected, find the probability that the person is a woman given that she has a master degree.

- 0.160
- 0.360
- 0.333
- 0.444

متصفح الأسئلة

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|---|----|----|----|----|----|
| ^ | 14 | 13 | 12 | 11 | 10 |
| | 19 | 18 | 17 | 16 | 15 |
| v | 24 | 23 | 22 | 21 | 20 |



متصفح الأسئلة

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If (x) is the number of exercising hours and (y) is the weight, choose the regression line equation that represents the following statement: When the exercising hours increase 1 unit, the weight decreases (1.32) kg on average.

- $y' = 4 - 1.32x$
- $y' = -1.32 + 4x$
- $y' = 1.32 - 4x$
- $y' = -4 + 1.32x$

منصفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 4 | 3 | 2 | 1 | • |
| 8 | 7 | 6 | 5 | |
| 14 | 13 | 12 | 11 | 10 |
| 19 | 18 | 17 | 16 | 15 |



منصفح الأسئلة

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Second Exam STAT 110 Second Semester 1437-1438H

22 of 32

A school district contains 4 elementary schools, 5 middle schools, and 6 high schools. If two schools are selected at random without replacement, find the probability that both of them are elementary schools.

- 0.250
- 0.057
- 0.167
- 0.071

منصح الأسئلة

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|----|----|----|----|----|
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |
| 29 | 28 | 27 | 26 | 25 |

منصح الأسئلة

السؤال التالي <

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Answer the attached question:

The following data are recorded:

$$n = 10, \sum x = 116, \sum y = 70, \sum xy = 50, \text{ and } \sum x^2 = 120$$

The equation of the regression line is:

متصفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |
| 29 | 28 | 27 | 26 | 25 |
| | | 32 | 31 | 30 |



متصفح الأسئلة

السؤال التالي <

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The following data are recorded:

$n = 10$, $\sum x = 116$, $\sum y = 70$, $\sum xy = 50$, and $\sum x^2 = 120$

The equation of the regression line is:

- $y' = -0.212 + 0.622 x$
- $y' = 0.622 - 0.212 x$
- $y' = -7.056 + 2.407 x$
- $y' = 2.407 - 7.056 x$

اسئلة

| | | | |
|----|----|----|----|
| 19 | 18 | 17 | 16 |
| 24 | 23 | 22 | 21 |
| 29 | 28 | 27 | 26 |
| | | 32 | 31 |



مصصح الأسئلة

السؤال التالي <

إلى

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25 of 32 Find the sample space for tossing three coins.

- $S = \{H, T\}$
- 3
- $S = \{HHH, HHT, HTH, THH, TTH, THT, HTT, TTT\}$
- 8

فتح الأسئلة

| | | | | |
|----|----|----|----|---|
| 19 | 18 | 17 | 16 | 1 |
| 24 | 23 | 22 | 21 | 2 |
| 29 | 28 | 27 | 26 | 3 |
| | | 32 | 31 | 4 |



متصفح الأسئلة

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If the correlation coefficient between two variables equals (- 0.12), this means that the relationship between the two variables is:

- strong negative
- weak positive
- weak negative
- strong positive

متصفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |
| 29 | 28 | 27 | 26 | 25 |
| | | 32 | 31 | 30 |



متصفح الأسئلة

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Cards are numbered from 1 to 10. If a card is selected randomly and the number of it is noted, then it is replaced and a second card is selected, find the probability of getting an even number and an odd number.

- 0.278
- 1
- 0
- 0.25

متصفح الأسئلة

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|----|----|----|----|----|
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |
| 29 | 28 | 27 | 26 | 25 |
| | | 32 | 31 | 30 |



متصفح الأسئلة

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If an event E cannot occur, then its probability equals:

- $0 \leq P(E) \leq 1$
- 0
- 0.5
- 1

الأسئلة

| | | | |
|----|----|----|----|
| 19 | 18 | 17 | 16 |
| 24 | 23 | 22 | 21 |
| 25 | 28 | 27 | 26 |



متصفح الأسئلة

السؤال التالي <

سابق

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If A and B are mutually exclusive events with $P(A)=0.25$ and $P(A \text{ or } B)=0.4$, then find $P(B)$.

- 0.15
- 0.6
- 0.1
- 0.65

الأسئلة

| | | | |
|----|----|----|----|
| 19 | 18 | 17 | 16 |
| 24 | 23 | 22 | 21 |
| 29 | 28 | 27 | 26 |

متصفح الأسئلة < السؤال التالي > السابق

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18 of 32

In a club there are 5 women and 4 men. If a committee of 3 people is selected, find the probability that at least one of them is a man.

- 0.048
- 0.881
- 0.952
- 0.119

متصفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 14 | 13 | 12 | 11 | 10 |
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |



متصفح الأسئلة

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Second Exam STAT 110 Second Semester 14

17 of 32

Which of these cannot be considered a correlation coefficient?

- 1.89
- 0.89
- 0
- 0.89

| | | |
|----|----|----|
| 14 | 13 | 12 |
| 19 | 18 | 17 |
| 24 | 23 | 22 |

Second Exam STAT 110 Second Semester 1437-1438H

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A recent study found that 40% of Americans suffer from great stress. If 3 people are selected at random, find the probability that all of them suffer from great stress.

- 0.216
- 0.784
- 0.936
- 0.064

متصفح الأسئلة

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|----|----|----|----|----|
| 14 | 13 | 12 | 11 | 10 |
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |



متصفح الأسئلة

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An urn contains brown balls and white balls. A person selects two balls without replacement. If the probability of selecting a brown ball and a white ball is 0.20, and the probability of selecting a brown ball on the first draw is 0.42, find the probability of selecting a white ball on the second draw, given that the first selected ball was a brown ball.

- 0.220
 0.084
 2.100
 0.476

متصفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 9 | 8 | 7 | 6 | 5 |
| 14 | 13 | 12 | 11 | 10 |
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |



متصفح الأسئلة

السؤال التالي <

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Box 1 contains 2 red balls and 2 blue balls. Box 2 contains 3 red balls and 2 blue balls. A die is rolled. If the number is greater than 4, box 1 is selected and a ball is drawn. If the number is less than or equal 4, box 2 is selected and a ball is drawn. Find the probability of selecting a red ball.

- 1.1
- 0.833
- 0.389
- 0.567

متصفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 4 | 3 | 2 | 1 | • |
| 9 | 8 | 7 | 6 | 5 |
| 14 | 13 | 12 | 11 | 10 |
| 19 | 18 | 17 | 16 | 15 |

متصفح الأسئلة

السؤال التالي <

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If the regression line equation is $y' = 3 - 0.27x$, then the correlation coefficient is.....

- positive
- 0.27
- negative
- 3

من الأسئلة

| | | | |
|----|----|----|----|
| 4 | 3 | 2 | 1 |
| 9 | 8 | 7 | 6 |
| 14 | 13 | 12 | 11 |
| 19 | 18 | 17 | 16 |



متصفح الأسئلة

السؤال التالي <

السابق

Second Exam STAT 110 Second Semester 1

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"Having a large shoe size and having a high score." These events are said to be even

- mutually exclusive
- certain
- dependent
- independent

| | |
|----|----|
| 4 | 3 |
| 9 | 8 |
| 14 | 13 |
| 19 | 18 |



متصفح الأسئلة

السؤال التالي <

Second Exam STAT 110 Second Semester 1437-1438H

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If a die is rolled one time, find the probability of getting a number greater than 2 or an odd number.

- 0.833
 0.333
 1
 1.167

متصفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |
| 29 | 28 | 27 | 26 | 25 |
| | | 32 | 31 | 30 |



متصفح الأسئلة

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The value of the correlation coefficient must be:

- $0 \leq r \leq 1$
- $-1 \leq r \leq 0$
- $-\infty \leq r \leq \infty$
- $-1 \leq r \leq 1$

متصفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |
| 29 | 28 | 27 | 26 | 25 |
| | | 32 | 31 | 30 |



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90% of electronic games players play online. If 3 players are selected at random, find the probability that at least one does **not** play online.

- 0.271
- 0.999
- 0.729
- 0.001

متصفح الأسئلة

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|----|----|----|----|----|
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |
| 29 | 28 | 27 | 26 | 25 |
| | | 32 | 31 | 30 |



متصفح الأسئلة

< السؤال التالي

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The grades obtained by five students in both STAT and MATH exams are shown in the following table:

| | | | | | |
|------|---|---|---|---|---|
| STAT | A | C | F | B | D |
| MATH | A | B | F | C | D |

Compute Spearman rank correlation coefficient.

- 0.9
- 0.9
- 0.1
- 0.1

متصفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 4 | 3 | 2 | 1 | * |
| 9 | 8 | 7 | 6 | 5 |
| 14 | 13 | 12 | 11 | 10 |
| 19 | 18 | 17 | 16 | 15 |



متصفح الأسئلة

السؤال التالي <

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A(n) is a graph of the ordered pairs (x, y) of numbers consisting of the independent variable x and the dependent variable y .

- scatter plot
- frequency polygon
- ogive
- time series graph

متصفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 3 | 2 | 1 | • | |
| 9 | 8 | 7 | 6 | 5 |
| 14 | 13 | 12 | 11 | 10 |
| 19 | 18 | 17 | 16 | 15 |



متصفح الأسئلة

السؤال التالي <

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Second Exam STAT 110 Second Semester 1

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The chance of an event occurring is called.....

- probability
- probability experiment
- probability distribution
- outcome

| | | |
|----|----|----|
| 9 | 8 | 7 |
| 14 | 13 | 12 |
| 19 | 18 | 17 |
| 24 | 23 | 22 |



متصفح الأسئلة

السؤال التالي <

Second Exam STAT 110 Second Semester 1437-1438

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A committee contains 8 members, 3 of which are men. If 3 members are selected at random, find the probability that one of them is a man.

- 0.179
- 0.375
- 0.536
- 0.232

متصفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 9 | 8 | 7 | 6 | 5 |
| 14 | 13 | 12 | 11 | 10 |
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |



متصفح الأسئلة

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Second Exam STAT 110 Second Semester 1

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How many ways can 6 employees be seated on a stage?

- 1
- 720
- 6
- 46,656

| | | |
|---|----|----|
| ^ | 19 | 18 |
| | 24 | 23 |
| v | 29 | 28 |



متصفح الأسئلة

السؤال التالي <

Second Exam STAT 110 Second Semester 1437-1438H

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When we study the relationship between the age of a house and its price, the correlation coefficient could be:

- 0.8
- 0.9
- 0
- 0.05

متصفح الأسئلة

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|----|----|----|----|----|
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |
| 29 | 28 | 27 | 26 | 25 |



متصفح الأسئلة

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In a hospital 32% of patients have type A blood, 15% of patients have type AB blood, and the others have type O blood. If a patient is selected randomly, find the probability that she has type O blood.

- 0.048
- 0
- 0.47
- 0.53

متصفح الأسئلة

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|----|----|----|----|----|
| 14 | 13 | 12 | 11 | 10 |
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |



متصفح الأسئلة

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In a club there are 5 women and 4 men. If a committee of 3 people is selected, find the probability that at least one of them is a man.

- 0.048
- 0.881
- 0.952
- 0.119

متصفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 14 | 13 | 12 | 11 | 10 |
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |



متصفح الأسئلة

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27 of 32

Answer the attached question:

The following data are recorded:

$$n = 10, \sum x = 116, \sum y = 70, \sum xy = 50, \text{ and } \sum x^2 = 120$$

The equation of the regression line is:

متصفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |
| 29 | 28 | 27 | 26 | 25 |
| | | 32 | 31 | 30 |



متصفح الأسئلة

السؤال التالي <

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The following data are recorded:

$n = 10$, $\sum x = 116$, $\sum y = 70$, $\sum xy = 50$, and $\sum x^2 = 120$

The equation of the regression line is:

- $y' = -0.212 + 0.622 x$
- $y' = 0.622 - 0.212 x$
- $y' = -7.056 + 2.407 x$
- $y' = 2.407 - 7.056 x$

اسئلة

| | | | |
|----|----|----|----|
| 19 | 18 | 17 | 16 |
| 24 | 23 | 22 | 21 |
| 29 | 28 | 27 | 26 |
| | | 32 | 31 |



متصفح الأسئلة

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إلى

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If the correlation coefficient between two variables equals (-0.12) , this means that the relationship between the two variables is:

- strong negative
- weak positive
- weak negative
- strong positive

متصفح الأسئلة

| | | | | |
|----|----|----|----|----|
| 19 | 18 | 17 | 16 | 15 |
| 24 | 23 | 22 | 21 | 20 |
| 29 | 28 | 27 | 26 | 25 |
| | | 32 | 31 | 30 |



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$n = 10$, $\sum x = 116$, $\sum y = 70$, $\sum xy = 50$, and $\sum x^2 = 120$

The equation of the regression line is:

- $y' = -0.212 + 0.622x$
- $y' = 0.622 - 0.212x$
- $y' = -7.056 + 2.407x$
- $y' = 2.407 - 7.056x$

1) If $\frac{x^2 - 9}{x - 3} \leq f(x) \leq x + 3$, then $\lim_{x \rightarrow 0} f(x) =$

- A does not exist B -3 C 0 D 3

2) The domain of the function $f(x) = \frac{1}{2 - e^x}$ is

- A $(2, \infty)$ B $\mathbb{R} = (-\infty, \infty)$
 C $(-2, \infty)$ D $\mathbb{R} \setminus \{\ln 2\}$

3) $\lim_{x \rightarrow 0} \frac{\sin\left(\frac{3x}{2}\right)}{\tan\left(\frac{5x}{7}\right)} =$

- A $\frac{15}{14}$ B $\frac{21}{10}$ C $\frac{10}{21}$ D $\frac{14}{15}$

4) The inverse of the function $f = \{(0, 3), (-2, -1), (3, 4), (5, -2), (1, 7)\}$ is

- A $f^{-1} = \{(0, 3), (-1, -2), (4, 3), (-2, 5), (7, 1)\}$
 B $f^{-1} = \{(3, 0), (-1, -2), (4, 3), (-2, 5), (7, 1)\}$
 C $f^{-1} = \{(0, 3), (-2, -1), (4, 3), (-2, 5), (7, 1)\}$
 D $f^{-1} = \{(-2, -1), (3, 4), (5, -2), (1, 7), (0, 3)\}$

5) Find the inverse of the function $f(x) = \frac{3x + 1}{2x - 5}$.

- A $\frac{2x - 5}{3x + 1}$ B $\frac{5x + 1}{2x - 3}$ C $\frac{5x + 1}{2x + 3}$ D $\frac{5x - 1}{2x - 3}$

6) $\lim_{x \rightarrow 4} \frac{x^2 - 16}{x^2 - 4} =$

- A 0 B 1 C $\frac{1}{8}$ D 8

7) $\lim_{x \rightarrow \infty} \frac{\sqrt{5x^2 - 8} + 1}{x + 7} =$

- A 0 B $\sqrt{5}$ C $-\sqrt{5}$ D ∞

8) $\cos(2x) =$

- A $1 + 2\sin^2 x$ B $1 - 2\sin^2 x$ C $-1 - 2\sin^2 x$ D $-1 + 2\sin^2 x$

| |
|---|
| 9) If $2^{x^2+5x+9} = 8$, then $x =$ |
| <input type="checkbox"/> A -3 or -2 <input type="checkbox"/> B -6 or -1 <input type="checkbox"/> C 6 or 1 <input type="checkbox"/> D 2 or 3 |
| 10) $\lim_{x \rightarrow 4} \frac{x^2 - 3x - 4}{x - 4} =$ |
| <input type="checkbox"/> A -5 <input type="checkbox"/> B 8 <input type="checkbox"/> C 5 <input type="checkbox"/> D does not exist |
| 11) The number k that makes $f(x) = \begin{cases} k^2x^2 + 3x + 1 & ;x \leq 1 \\ 5kx - 2 & ;x > 1 \end{cases}$ continuous at 1 is |
| <input type="checkbox"/> A -3 or -2 <input type="checkbox"/> B -6 or -1 <input type="checkbox"/> C 6 or 1 <input type="checkbox"/> D 2 or 3 |
| 12) $\lim_{x \rightarrow -2} (x^3 - 2x + 1) =$ |
| <input type="checkbox"/> A -3 <input type="checkbox"/> B 3 <input type="checkbox"/> C -11 <input type="checkbox"/> D 13 |
| 13) $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right) =$ |
| <input type="checkbox"/> A $\frac{\pi}{2}$ rad <input type="checkbox"/> B $\frac{\pi}{4}$ rad <input type="checkbox"/> C $\frac{\pi}{3}$ rad <input type="checkbox"/> D $\frac{\pi}{6}$ rad |
| 14) $\lim_{x \rightarrow 0} \frac{x^3 + 3x^2}{x^2} =$ |
| <input type="checkbox"/> A 3 <input type="checkbox"/> B -7 <input type="checkbox"/> C -3 <input type="checkbox"/> D 7 |
| 15) If $\sin(x) = \frac{1}{7}$, and $0 < x < \frac{\pi}{2}$, then $\cos(x) =$ |
| <input type="checkbox"/> A $\frac{1}{4\sqrt{3}}$ <input type="checkbox"/> B $4\sqrt{3}$ <input type="checkbox"/> C $\frac{4\sqrt{3}}{7}$ <input type="checkbox"/> D $\frac{7}{4\sqrt{3}}$ |
| 16) $\lim_{x \rightarrow 0} \frac{\sqrt{x+9} - 3}{x} =$ |
| <input type="checkbox"/> A 0 <input type="checkbox"/> B 1 <input type="checkbox"/> C $\frac{1}{6}$ <input type="checkbox"/> D 6 |
| 17) If $f(x) = \cos x$, then $D_f =$ |
| <input type="checkbox"/> A $(-\infty, 1]$ <input type="checkbox"/> B $(-\infty, -1)$ <input type="checkbox"/> C $[-1, 1]$ <input type="checkbox"/> D $\mathbb{R} = (-\infty, \infty)$ |
| 18) If $f(x) = \begin{cases} 2x + 3 & ;x \geq -2 \\ 2x + 5 & ;x < -2 \end{cases}$, then $\lim_{x \rightarrow -2} f(x) =$ |
| <input type="checkbox"/> A 3 <input type="checkbox"/> B does not exist <input type="checkbox"/> C 1 <input type="checkbox"/> D -1 |
| 19) $\frac{11\pi}{6}$ rad = |
| <input type="checkbox"/> A 210° <input type="checkbox"/> B 240° <input type="checkbox"/> C 300° <input type="checkbox"/> D 330° |

| | | | | | |
|-----|---|--|---|---|---|
| 20) | $300^\circ =$ | <input type="checkbox"/> $\frac{4\pi}{3}$ rad | <input type="checkbox"/> $\frac{5\pi}{3}$ rad | <input type="checkbox"/> $\frac{7\pi}{6}$ rad | <input type="checkbox"/> $\frac{11\pi}{6}$ rad |
| 21) | The function $f(x) = \frac{x+1}{2-\ln x}$ is continuous on | <input type="checkbox"/> \mathbb{R} | <input type="checkbox"/> $\mathbb{R} \setminus \{\ln 2\}$ | <input type="checkbox"/> $\mathbb{R} \setminus \{2\}$ | <input type="checkbox"/> $\mathbb{R} \setminus \{e^2\}$ |
| 22) | The vertical asymptote of $f(x) = \frac{3-x}{x^2-5x-6}$ is | <input type="checkbox"/> $y = -1,6$ | <input type="checkbox"/> $x = -1,6$ | <input type="checkbox"/> $x = -6,1$ | <input type="checkbox"/> $y = -6,1$ |
| 23) | $\lim_{x \rightarrow 9^+} \frac{ x-9 }{x-9} =$ | <input type="checkbox"/> does not exist | <input type="checkbox"/> 1 | <input type="checkbox"/> 0 | <input type="checkbox"/> -1 |
| 24) | $\lim_{x \rightarrow 3} \frac{x^3-27}{x-3} =$ | <input type="checkbox"/> does not exist | <input type="checkbox"/> $\frac{1}{18}$ | <input type="checkbox"/> $\frac{1}{27}$ | <input type="checkbox"/> 27 |
| 25) | $\lim_{x \rightarrow \frac{\pi}{3}} (\sin x - \cos x) =$ | <input type="checkbox"/> $\frac{-\sqrt{3}-1}{2}$ | <input type="checkbox"/> $\frac{\sqrt{3}-1}{2}$ | <input type="checkbox"/> $\frac{\sqrt{3}+1}{2}$ | <input type="checkbox"/> $\frac{1-\sqrt{3}}{2}$ |
| 26) | Find the range of the function $f(x) = 3^x$. | <input type="checkbox"/> $(0, \infty)$ | <input type="checkbox"/> $\mathbb{R} = (-\infty, \infty)$ | <input type="checkbox"/> $(-\infty, 0)$ | <input type="checkbox"/> $[-1, 1]$ |
| 27) | $\lim_{x \rightarrow \infty} \frac{3x^2-5x+9}{6x^2+3x+2} =$ | <input type="checkbox"/> $\frac{1}{6}$ | <input type="checkbox"/> $\frac{1}{2}$ | <input type="checkbox"/> ∞ | <input type="checkbox"/> 0 |
| 28) | Find the domain of the function $f(x) = \sin^{-1}(2x-5)$. | <input type="checkbox"/> $[2, 3]$ | <input type="checkbox"/> $(2, 3)$ | <input type="checkbox"/> $[-2, 3]$ | <input type="checkbox"/> $[-1, 1]$ |
| 29) | $\log_2 64 + \log_2 32 + 3\log_2 2 =$ | <input type="checkbox"/> 4 | <input type="checkbox"/> 14 | <input type="checkbox"/> 8 | <input type="checkbox"/> -2 |
| 30) | $\sec\left(\frac{5\pi}{6}\right) =$ | <input type="checkbox"/> $-\frac{2}{\sqrt{3}}$ | <input type="checkbox"/> $-\frac{\sqrt{3}}{2}$ | <input type="checkbox"/> $-\frac{1}{\sqrt{3}}$ | <input type="checkbox"/> $-\sqrt{3}$ |

1) $\frac{5\pi}{3}$ rad =
 A 210° B 240° C 300° D 330°

2) $210^\circ =$
 A $\frac{4\pi}{3}$ rad B $\frac{5\pi}{3}$ rad C $\frac{7\pi}{6}$ rad D $\frac{11\pi}{6}$ rad

3) $\lim_{x \rightarrow 3} \frac{x-3}{x^3-27} =$
 A 27 B $\frac{1}{18}$ C $\frac{1}{27}$ D does not exist

4) $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right) =$
 A $\frac{\pi}{3}$ rad B $\frac{\pi}{6}$ rad C $\frac{\pi}{2}$ rad D $\frac{\pi}{4}$ rad

5) If $\sin(x) = \frac{1}{7}$, and $0 < x < \frac{\pi}{2}$, then $\cot(x) =$
 A $\frac{1}{4\sqrt{3}}$ B $4\sqrt{3}$ C $\frac{4\sqrt{3}}{7}$ D $\frac{7}{4\sqrt{3}}$

6) $\log_2 64 + \log_2 32 - 3\log_2 2 =$
 A 4 B 14 C 8 D -2

7) The vertical asymptote of $f(x) = \frac{3-x}{x^2+5x-6}$ is
 A $y = -1,6$ B $x = -1,6$ C $x = -6,1$ D $y = -6,1$

8) $\lim_{x \rightarrow 0} \frac{\sqrt{x+25}-5}{x} =$
 A $\frac{1}{10}$ B 1 C 0 D 10

9) If $f(x) = \begin{cases} 2x+3 & ;x \geq -2 \\ 2x+5 & ;x < -2 \end{cases}$, then $\lim_{x \rightarrow -2^+} f(x) =$
 A 3 B does not exist C 1 D -1

10) $\lim_{x \rightarrow -2} (x^3 - 2x + 1) =$
 A 3 B -3 C -11 D 13

| | | | | | |
|-----|--|--|--|--|--|
| 11) | $\lim_{x \rightarrow \infty} \frac{\sqrt{2x^2 - 8} + 1}{x + 7} =$ | <input type="checkbox"/> A $\sqrt{2}$ | <input type="checkbox"/> B 0 | <input type="checkbox"/> C $-\sqrt{2}$ | <input type="checkbox"/> D ∞ |
| 12) | If $\frac{x^2 + 9}{x - 3} \leq f(x) \leq x - 3$, then $\lim_{x \rightarrow 0} f(x) =$ | <input type="checkbox"/> A does not exist | <input type="checkbox"/> B -3 | <input type="checkbox"/> C 0 | <input type="checkbox"/> D 3 |
| 13) | $\tan\left(\frac{5\pi}{6}\right) =$ | <input type="checkbox"/> A $-\frac{2}{\sqrt{3}}$ | <input type="checkbox"/> B $-\frac{\sqrt{3}}{2}$ | <input type="checkbox"/> C $-\frac{1}{\sqrt{3}}$ | <input type="checkbox"/> D $-\sqrt{3}$ |
| 14) | $\lim_{x \rightarrow 4} \frac{x^2 - 3x - 4}{x - 4} =$ | <input type="checkbox"/> A 5 | <input type="checkbox"/> B 8 | <input type="checkbox"/> C -5 | <input type="checkbox"/> D does not exist |
| 15) | $\lim_{x \rightarrow \frac{\pi}{3}} (\sin x + \cos x) =$ | <input type="checkbox"/> A $\frac{-\sqrt{3} - 1}{2}$ | <input type="checkbox"/> B $\frac{\sqrt{3} - 1}{2}$ | <input type="checkbox"/> C $\frac{\sqrt{3} + 1}{2}$ | <input type="checkbox"/> D $\frac{1 - \sqrt{3}}{2}$ |
| 16) | The domain of the function $f(x) = \frac{1}{3 - e^x}$ is | <input type="checkbox"/> A $\mathbb{R} \setminus \{\ln 3\}$ | <input type="checkbox"/> B $\mathbb{R} = (-\infty, \infty)$ | <input type="checkbox"/> C $(-3, \infty)$ | <input type="checkbox"/> D $(3, \infty)$ |
| 17) | The inverse of the function $f = \{(0, 3), (-2, 1), (3, 4), (5, -2), (7, 1)\}$ is | <input type="checkbox"/> A $f^{-1} = \{(3, 0), (1, -2), (4, 3), (-2, 5), (1, 7)\}$ | <input type="checkbox"/> B $f^{-1} = \{(0, 3), (1, -2), (4, 3), (-2, 5), (7, 1)\}$ | <input type="checkbox"/> C $f^{-1} = \{(0, 3), (-2, 1), (4, 3), (-2, 5), (1, 7)\}$ | <input type="checkbox"/> D $f^{-1} = \{(-2, 1), (3, 4), (5, -2), (1, 7), (0, 3)\}$ |
| 18) | $\lim_{x \rightarrow \infty} \frac{5x^2 - 5x + 9}{10x^2 + 3x + 2} =$ | <input type="checkbox"/> A $\frac{1}{2}$ | <input type="checkbox"/> B $\frac{1}{10}$ | <input type="checkbox"/> C ∞ | <input type="checkbox"/> D 0 |
| 19) | $\lim_{x \rightarrow 4} \frac{x - 4}{x^2 - 16} =$ | <input type="checkbox"/> A 8 | <input type="checkbox"/> B 1 | <input type="checkbox"/> C $\frac{1}{8}$ | <input type="checkbox"/> D 0 |
| 20) | $\cos(2x) =$ | <input type="checkbox"/> A $1 + 2\cos^2 x$ | <input type="checkbox"/> B $1 - 2\cos^2 x$ | <input type="checkbox"/> C $-1 - 2\cos^2 x$ | <input type="checkbox"/> D $-1 + 2\cos^2 x$ |

| | | | | | |
|-----|--|---|---|---|--|
| 21) | $\lim_{x \rightarrow 0} \frac{x^3 - 7x^2}{x^2} =$ | <input type="checkbox"/> A 3 | <input type="checkbox"/> B -7 | <input type="checkbox"/> C -3 | <input type="checkbox"/> D 7 |
| 22) | Find the domain of the function $f(x) = \sin^{-1}(2x - 11)$. | <input type="checkbox"/> A (5,6) | <input type="checkbox"/> B [5,6] | <input type="checkbox"/> C [-5,6] | <input type="checkbox"/> D [-1,1] |
| 23) | The function $f(x) = \frac{x+1}{3-\ln x}$ is continuous on | <input type="checkbox"/> A $\mathbb{R} \setminus \{e^3\}$ | <input type="checkbox"/> B $\mathbb{R} \setminus \{\ln 3\}$ | <input type="checkbox"/> C $\mathbb{R} \setminus \{3\}$ | <input type="checkbox"/> D \mathbb{R} |
| 24) | If $2^{x^2-7x+9} = 8$, then $x =$ | <input type="checkbox"/> A -3 or -2 | <input type="checkbox"/> B -6 or -1 | <input type="checkbox"/> C 6 or 1 | <input type="checkbox"/> D 2 or 3 |
| 25) | $\lim_{x \rightarrow 7^-} \frac{ x-7 }{x-7} =$ | <input type="checkbox"/> A does not exist | <input type="checkbox"/> B 0 | <input type="checkbox"/> C 1 | <input type="checkbox"/> D -1 |
| 26) | Find the inverse of the function $f(x) = \frac{3x+4}{7x-5}$. | <input type="checkbox"/> A $\frac{7x-5}{3x+4}$ | <input type="checkbox"/> B $\frac{5x-4}{7x-3}$ | <input type="checkbox"/> C $\frac{5x+4}{7x-3}$ | <input type="checkbox"/> D $\frac{5x-4}{7x+3}$ |
| 27) | $\lim_{x \rightarrow 0} \frac{\sin\left(\frac{5x}{7}\right)}{\tan\left(\frac{3x}{2}\right)} =$ | <input type="checkbox"/> A $\frac{15}{14}$ | <input type="checkbox"/> B $\frac{21}{10}$ | <input type="checkbox"/> C $\frac{10}{21}$ | <input type="checkbox"/> D $\frac{14}{15}$ |
| 28) | If $f(x) = \sin x$, then $R_f =$ | <input type="checkbox"/> A [-1,1] | <input type="checkbox"/> B (0,1) | <input type="checkbox"/> C $\mathbb{R} = (-\infty, \infty)$ | <input type="checkbox"/> D (-1,0] |
| 29) | Find the domain of the function $f(x) = 7^x$. | <input type="checkbox"/> A (0, ∞) | <input type="checkbox"/> B $\mathbb{R} = (-\infty, \infty)$ | <input type="checkbox"/> C $(-\infty, 0)$ | <input type="checkbox"/> D [-1,1] |
| 30) | The number k that makes $f(x) = \begin{cases} k^2x^2 + 3x + 1 & ; x \leq 1 \\ -7kx - 2 & ; x > 1 \end{cases}$ continuous at 1 is | <input type="checkbox"/> A -3 or -2 | <input type="checkbox"/> B -6 or -1 | <input type="checkbox"/> C 6 or 1 | <input type="checkbox"/> D 2 or 3 |

1) The function $f(x) = \frac{x+1}{5-\ln x}$ is continuous on
 A $\mathbb{R} \setminus \{\ln 5\}$ B $\mathbb{R} \setminus \{e^5\}$ C $\mathbb{R} \setminus \{5\}$ D \mathbb{R}

2) If $f(x) = \sin x$, then $D_f =$
 A $(-\infty, 1]$ B $(-\infty, -1)$ C $\mathbb{R} = (-\infty, \infty)$ D $[-1, 1]$

3) If $\sin(x) = \frac{1}{7}$, and $0 < x < \frac{\pi}{2}$, then $\sec(x) =$
 A $\frac{1}{4\sqrt{3}}$ B $4\sqrt{3}$ C $\frac{4\sqrt{3}}{7}$ D $\frac{7}{4\sqrt{3}}$

4) $\lim_{x \rightarrow \infty} \frac{\sqrt{7x^2 - 8} + 1}{x + 1} =$
 A $-\sqrt{7}$ B 0 C $\sqrt{7}$ D ∞

5) The domain of the function $f(x) = \frac{1}{7-e^x}$ is
 A $\mathbb{R} = (-\infty, \infty)$ B $\mathbb{R} \setminus \{\ln 7\}$ C $(-7, \infty)$ D $(7, \infty)$

6) $\lim_{x \rightarrow 4} \frac{x^2 - 3x - 4}{x - 4} =$
 A 8 B 5 C -5 D does not exist

7) Find the range of the function $f(x) = 2^x$.
 A $(-\infty, 0)$ B $[-1, 1]$ C $(0, \infty)$ D $\mathbb{R} = (-\infty, \infty)$

8) If $f(x) = \begin{cases} 2x + 3 & ; x \geq -2 \\ 2x + 5 & ; x < -2 \end{cases}$, then $\lim_{x \rightarrow -2} f(x) =$
 A 3 B does not exist
 C 1 D -1

9) If $\frac{x^2 - 4}{x - 2} \leq f(x) \leq x + 2$, then $\lim_{x \rightarrow 0} f(x) =$
 A -2 B does not exist C 2 D 0

10) $\cot\left(\frac{5\pi}{6}\right) =$
 A $-\frac{2}{\sqrt{3}}$ B $-\frac{\sqrt{3}}{2}$ C $-\frac{1}{\sqrt{3}}$ D $-\sqrt{3}$

| | | | | | |
|-----|--|--|--|--|--|
| 11) | $\lim_{x \rightarrow -2} (x^3 - 2x + 1) =$ | <input type="checkbox"/> A - 11 | <input type="checkbox"/> B 3 | <input type="checkbox"/> C -3 | <input type="checkbox"/> D 13 |
| 12) | Find the domain of the function $f(x) = \cos^{-1}(2x - 9)$. | <input type="checkbox"/> A (4,5) | <input type="checkbox"/> B [-4,5] | <input type="checkbox"/> C [4,5] | <input type="checkbox"/> D [-1,1] |
| 13) | $\log_2 64 - \log_2 32 - 3\log_2 2 =$ | <input type="checkbox"/> A 4 | <input type="checkbox"/> B 14 | <input type="checkbox"/> C 8 | <input type="checkbox"/> D -2 |
| 14) | Find the inverse of the function $f(x) = \frac{2x - 7}{3x - 9}$. | <input type="checkbox"/> A $\frac{3x - 9}{2x - 7}$ | <input type="checkbox"/> B $\frac{9x - 7}{3x - 2}$ | <input type="checkbox"/> C $\frac{9x + 7}{3x + 2}$ | <input type="checkbox"/> D $\frac{9x - 7}{3x + 2}$ |
| 15) | The vertical asymptote of $f(x) = \frac{3-x}{x^2+x-6}$ is | <input type="checkbox"/> A $y = -3, 2$ | <input type="checkbox"/> B $x = -3, 2$ | <input type="checkbox"/> C $x = -2, 3$ | <input type="checkbox"/> D $y = -2, 3$ |
| 16) | $\lim_{x \rightarrow 0} \frac{x^3 - 3x^2}{x^2} =$ | <input type="checkbox"/> A 3 | <input type="checkbox"/> B -7 | <input type="checkbox"/> C -3 | <input type="checkbox"/> D 7 |
| 17) | The number k that makes $f(x) = \begin{cases} k^2x^2 + 3x + 1 & : x \leq 1 \\ -5kx - 2 & ; x > 1 \end{cases}$ continuous at 1 is | <input type="checkbox"/> A -3 or -2 | <input type="checkbox"/> B -6 or -1 | <input type="checkbox"/> C 6 or 1 | <input type="checkbox"/> D 2 or 3 |
| 18) | $\lim_{x \rightarrow 7} \frac{x - 7}{x^2 - 49} =$ | <input type="checkbox"/> A 14 | <input type="checkbox"/> B $\frac{1}{14}$ | <input type="checkbox"/> C 1 | <input type="checkbox"/> D 0 |
| 19) | $\lim_{x \rightarrow 2} \frac{x - 2}{x^3 - 8} =$ | <input type="checkbox"/> A 12 | <input type="checkbox"/> B $\frac{1}{12}$ | <input type="checkbox"/> C $\frac{1}{8}$ | <input type="checkbox"/> D does not exist |
| 20) | The inverse of the function $f = \{(0,3), (-2,1), (3,4), (5,1), (7,1)\}$ is | <input type="checkbox"/> A $f^{-1} = \{(-2,1), (3,4), (5,1), (1,7), (0,3)\}$ | <input type="checkbox"/> B $f^{-1} = \{(0,3), (1,-2), (4,3), (1,5), (7,1)\}$ | <input type="checkbox"/> C $f^{-1} = \{(0,3), (-2,1), (4,3), (1,5), (1,7)\}$ | <input type="checkbox"/> D $f^{-1} = \{(3,0), (1,-2), (4,3), (1,5), (1,7)\}$ |

| | | | | | |
|-----|--|--|---|---|---|
| 21) | $\tan^{-1}\left(\frac{1}{\sqrt{3}}\right) =$ | <input type="checkbox"/> A $\frac{\pi}{3}$ rad | <input type="checkbox"/> B $\frac{\pi}{6}$ rad | <input type="checkbox"/> C $\frac{\pi}{2}$ rad | <input type="checkbox"/> D $\frac{\pi}{4}$ rad |
| 22) | $\lim_{x \rightarrow \infty} \frac{2x^2 - 5x + 1}{8x^2 + 3x - 2} =$ | <input type="checkbox"/> A 0 | <input type="checkbox"/> B $\frac{1}{8}$ | <input type="checkbox"/> C ∞ | <input type="checkbox"/> D $\frac{1}{4}$ |
| 23) | If $2^{x^2 - 5x + 9} = 8$, then $x =$ | <input type="checkbox"/> A -3 or -2 | <input type="checkbox"/> B -6 or -1 | <input type="checkbox"/> C 6 or 1 | <input type="checkbox"/> D 2 or 3 |
| 24) | $\lim_{x \rightarrow 2^+} \frac{ x - 2 }{x - 2} =$ | <input type="checkbox"/> A does not exist | <input type="checkbox"/> B 0 | <input type="checkbox"/> C 1 | <input type="checkbox"/> D -1 |
| 25) | $\lim_{x \rightarrow 0} \frac{x}{\sqrt{x + 49} - 7} =$ | <input type="checkbox"/> A $\frac{1}{14}$ | <input type="checkbox"/> B 14 | <input type="checkbox"/> C 0 | <input type="checkbox"/> D 1 |
| 26) | $\lim_{x \rightarrow \frac{\pi}{3}} (\cos x - \sin x) =$ | <input type="checkbox"/> A $\frac{-\sqrt{3} - 1}{2}$ | <input type="checkbox"/> B $\frac{\sqrt{3} - 1}{2}$ | <input type="checkbox"/> C $\frac{\sqrt{3} + 1}{2}$ | <input type="checkbox"/> D $\frac{1 - \sqrt{3}}{2}$ |
| 27) | $-\cos(2x) =$ | <input type="checkbox"/> A $-1 - 2\sin^2 x$ | <input type="checkbox"/> B $1 - 2\sin^2 x$ | <input type="checkbox"/> C $-1 + 2\sin^2 x$ | <input type="checkbox"/> D $1 + 2\sin^2 x$ |
| 28) | $\lim_{x \rightarrow 0} \frac{\sin\left(\frac{2x}{3}\right)}{\tan\left(\frac{5x}{7}\right)} =$ | <input type="checkbox"/> A $\frac{15}{14}$ | <input type="checkbox"/> B $\frac{21}{10}$ | <input type="checkbox"/> C $\frac{10}{21}$ | <input type="checkbox"/> D $\frac{14}{15}$ |
| 29) | $330^\circ =$ | <input type="checkbox"/> A $\frac{4\pi}{3}$ rad | <input type="checkbox"/> B $\frac{5\pi}{3}$ rad | <input type="checkbox"/> C $\frac{7\pi}{6}$ rad | <input type="checkbox"/> D $\frac{11\pi}{6}$ rad |
| 30) | $\frac{7\pi}{6}$ rad = | <input type="checkbox"/> A 210° | <input type="checkbox"/> B 240° | <input type="checkbox"/> C 300° | <input type="checkbox"/> D 330° |

1) The vertical asymptote of $f(x) = \frac{7-x}{x^2-x-6}$ is

- A $y = -3,2$ B $x = -3,2$
 C $x = -2,3$ D $y = -2,3$

2) $\lim_{x \rightarrow 0} \frac{\sin\left(\frac{5x}{7}\right)}{\tan\left(\frac{2x}{3}\right)} =$

- A $\frac{15}{14}$ B $\frac{21}{10}$ C $\frac{10}{21}$ D $\frac{14}{15}$

3) If $f(x) = \begin{cases} 2x+7 & ;x \geq -2 \\ 3x+9 & ;x < -2 \end{cases}$, then $\lim_{x \rightarrow -2} f(x) =$

- A 3 B does not exist C 1 D -1

4) The inverse of the function $f = \{(2,3), (-2,1), (3,4), (5,1), (7,1)\}$ is .

- A $f^{-1} = \{(-2,1), (3,4), (5,1), (1,7), (2,3)\}$
 B $f^{-1} = \{(2,3), (1,-2), (4,3), (1,5), (7,1)\}$
 C $f^{-1} = \{(3,2), (1,-2), (4,3), (1,5), (1,7)\}$
 D $f^{-1} = \{(2,3), (-2,1), (4,3), (1,5), (1,7)\}$

5) $\log_2 64 - \log_2 32 + 3\log_2 2 =$

- A 4 B 14 C 8 D -2

6) $300^\circ =$

- A $\frac{4\pi}{3}$ rad B $\frac{5\pi}{3}$ rad C $\frac{7\pi}{6}$ rad D $\frac{11\pi}{6}$ rad

7) $\frac{4\pi}{3}$ rad =

- A 210° B 240° C 300° D 330°

8) The function $f(x) = \frac{x+1}{7-\ln x}$ is continuous on

- A $\mathbb{R} \setminus \{\ln 7\}$ B $\mathbb{R} \setminus \{7\}$ C $\mathbb{R} \setminus \{e^7\}$ D \mathbb{R}

9) $\lim_{x \rightarrow \infty} \frac{\sqrt{13x^2 - 8} + 6}{x+1} =$

- A $-\sqrt{13}$ B 0 C ∞ D $\sqrt{13}$

| |
|---|
| 10) $-\cos(2x) =$ <input type="checkbox"/> A $1 - 2\cos^2 x$ <input type="checkbox"/> B $-1 - 2\cos^2 x$ <input type="checkbox"/> C $-1 + 2\cos^2 x$ <input type="checkbox"/> D $1 + 2\cos^2 x$ |
| 11) $\lim_{x \rightarrow -2} (x^3 - 2x + 1) =$ <input type="checkbox"/> A -11 <input type="checkbox"/> B 3 <input type="checkbox"/> C 13 <input type="checkbox"/> D -3 |
| 12) $\lim_{x \rightarrow \infty} \frac{3x^2 - 8x + 15}{9x^2 + 4x - 13} =$ <input type="checkbox"/> A 0 <input type="checkbox"/> B $\frac{1}{9}$ <input type="checkbox"/> C $\frac{1}{3}$ <input type="checkbox"/> D ∞ |
| 13) $\lim_{x \rightarrow 0} \frac{x^3 + 7x^2}{x^2} =$ <input type="checkbox"/> A 3 <input type="checkbox"/> B -7 <input type="checkbox"/> C -3 <input type="checkbox"/> D 7 |
| 14) The number k that makes $f(x) = \begin{cases} k^2 x^2 + 3x + 1 & : x \leq 1 \\ 7kx - 2 & ; x > 1 \end{cases}$ continuous at 1 is <input type="checkbox"/> A -3 or -2 <input type="checkbox"/> B -6 or -1 <input type="checkbox"/> C 6 or 1 <input type="checkbox"/> D 2 or 3 |
| 15) $\lim_{x \rightarrow 4} \frac{x^2 - 3x - 4}{x - 4} =$ <input type="checkbox"/> A 8 <input type="checkbox"/> B does not exist <input type="checkbox"/> C -5 <input type="checkbox"/> D 5 |
| 16) Find the inverse of the function $f(x) = \frac{7x + 2}{3x - 9}$. <input type="checkbox"/> A $\frac{9x + 2}{3x - 7}$ <input type="checkbox"/> B $\frac{9x - 2}{3x + 7}$ <input type="checkbox"/> C $\frac{9x - 2}{3x - 7}$ <input type="checkbox"/> D $\frac{3x - 9}{7x + 2}$ |
| 17) $\lim_{x \rightarrow 0} \frac{x}{\sqrt{x + 16} - 4} =$ <input type="checkbox"/> A $\frac{1}{8}$ <input type="checkbox"/> B 0 <input type="checkbox"/> C 8 <input type="checkbox"/> D 1 |
| 18) If $2^{x^2 + 7x + 9} = 8$, then $x =$ <input type="checkbox"/> A -3 or -2 <input type="checkbox"/> B -6 or -1 <input type="checkbox"/> C 6 or 1 <input type="checkbox"/> D 2 or 3 |
| 19) If $f(x) = \cos x$, then $R_f =$ <input type="checkbox"/> A $(0, 1)$ <input type="checkbox"/> B $[-1, 1]$ <input type="checkbox"/> C $\mathbb{R} = (-\infty, \infty)$ <input type="checkbox"/> D $(-1, 0]$ |
| 20) $\lim_{x \rightarrow 7} \frac{x^2 - 49}{x - 7} =$ <input type="checkbox"/> A 14 <input type="checkbox"/> B $\frac{1}{14}$ <input type="checkbox"/> C 1 <input type="checkbox"/> D 0 |

| | | | |
|--|---|---|---|
| 21) Find the domain of the function $f(x) = 5^x$. | | | |
| <input type="checkbox"/> A $(-\infty, 0)$ | <input type="checkbox"/> B $[-1, 1]$ | <input type="checkbox"/> C $(0, \infty)$ | <input type="checkbox"/> D $\mathbb{R} = (-\infty, \infty)$ |
| 22) $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right) =$ | | | |
| <input type="checkbox"/> A $\frac{\pi}{3}$ rad | <input type="checkbox"/> B $\frac{\pi}{6}$ rad | <input type="checkbox"/> C $\frac{\pi}{2}$ rad | <input type="checkbox"/> D $\frac{\pi}{4}$ rad |
| 23) $\lim_{x \rightarrow \frac{\pi}{3}} (-\cos x - \sin x) =$ | | | |
| <input type="checkbox"/> A $\frac{-\sqrt{3}-1}{2}$ | <input type="checkbox"/> B $\frac{\sqrt{3}-1}{2}$ | <input type="checkbox"/> C $\frac{\sqrt{3}+1}{2}$ | <input type="checkbox"/> D $\frac{1-\sqrt{3}}{2}$ |
| 24) Find the domain of the function $f(x) = \sin^{-1}(2x - 7)$. | | | |
| <input type="checkbox"/> A $(3, 4)$ | <input type="checkbox"/> B $[-3, 4]$ | <input type="checkbox"/> C $[-1, 1]$ | <input type="checkbox"/> D $[3, 4]$ |
| 25) $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x - 2} =$ | | | |
| <input type="checkbox"/> A 12 | <input type="checkbox"/> B $\frac{1}{12}$ | <input type="checkbox"/> C 8 | <input type="checkbox"/> D does not exist |
| 26) If $\sin(x) = \frac{1}{7}$, and $0 < x < \frac{\pi}{2}$, then $\tan(x) =$ | | | |
| <input type="checkbox"/> A $\frac{1}{4\sqrt{3}}$ | <input type="checkbox"/> B $4\sqrt{3}$ | <input type="checkbox"/> C $\frac{4\sqrt{3}}{7}$ | <input type="checkbox"/> D $\frac{7}{4\sqrt{3}}$ |
| 27) If $\frac{x^2 + 4}{x - 2} \leq f(x) \leq x - 2$, then $\lim_{x \rightarrow 0} f(x) =$ | | | |
| <input type="checkbox"/> A -2 | <input type="checkbox"/> B does not exist | <input type="checkbox"/> C 2 | <input type="checkbox"/> D 0 |
| 28) $\cos\left(\frac{5\pi}{6}\right) =$ | | | |
| <input type="checkbox"/> A $-\frac{2}{\sqrt{3}}$ | <input type="checkbox"/> B $-\frac{\sqrt{3}}{2}$ | <input type="checkbox"/> C $-\frac{1}{\sqrt{3}}$ | <input type="checkbox"/> D $-\sqrt{3}$ |
| 29) $\lim_{x \rightarrow 5} \frac{ x - 5 }{x - 5} =$ | | | |
| <input type="checkbox"/> A does not exist | <input type="checkbox"/> B 0 | <input type="checkbox"/> C 1 | <input type="checkbox"/> D -1 |
| 30) The domain of the function $f(x) = \frac{1}{5 - e^x}$ is | | | |
| <input type="checkbox"/> A $\mathbb{R} = (-\infty, \infty)$ | <input type="checkbox"/> B $(-5, \infty)$ | <input type="checkbox"/> C $\mathbb{R} \setminus \{\ln 5\}$ | <input type="checkbox"/> D $(5, \infty)$ |