(24) If $y = \sqrt{\sec(x)}$, then $y' =$

(a) $\frac{-1}{2}\sqrt{\csc(x)}\cot(x)$

(b) $\frac{1}{2}\sqrt{\csc(x)}\cot(x)$

(c) $\frac{-1}{2}\sqrt{\sec(x)}\tan(x)$

(d) $\frac{1}{2}\sqrt{\sec(x)}\tan(x)$

(25) If $f(x) = x^3 + x$, then $f'(x)\big|_{x=1} =$

(a) 1

(b) 2

(c) 4

(d) 5

(26) $\frac{d}{dx}\left(\frac{x}{x-3}\right) =$

(a) $\frac{4}{(x-3)^2}$

(b) $\frac{-4}{(x-3)^2}$

(c) $\frac{3}{(x-3)^2}$

(d) $\frac{-3}{(x-3)^2}$

(27) $\frac{d}{dx}\left[\cos(65^\circ) - \sin(x^2)\right] =$

(a) $-\sin(65^\circ) + \cos(x^2)$

(b) $-2x\cos(x^2)$

(c) $-\sin(65^\circ) + 2x\cos(x^2)$

(d) $2x\cos(x^2)$

(28) $4\lim_{x\to 0}\left(\frac{\tan(2x)}{x}\right) =$

(a) 4

(b) 6

(c) 8

(d) 10

(29) If $y = \sqrt{x} - \csc(\pi x)$, then $y' =$

(a) $y = \frac{1}{2\sqrt{x}} - \pi\sec(\pi x)\tan(\pi x)$

(b) $y = \frac{1}{2\sqrt{x}} - \pi\csc(\pi x)\cot(\pi x)$

(c) $y = \frac{1}{2\sqrt{x}} + \pi\sec(\pi x)\tan(\pi x)$

(d) $y = \frac{1}{2\sqrt{x}} + \pi\csc(\pi x)\cot(\pi x)$

(19) The continuous extension of the function $f(x)=\frac{x-2}{x^2-4}$ at $x=2$ is

(a) $f(x)=\begin{cases}\frac{x-2}{x^2-4}, & x\neq 2\\ \frac{1}{4}, & x=2\end{cases}$

(b) $f(x)=\begin{cases}\frac{x-2}{x^2-4}, & x\neq 2\\ \frac{1}{2}, & x=2\end{cases}$

(c) $f(x)=\begin{cases}\frac{x-2}{x^2-4}, & x\neq 2\\ \frac{1}{8}, & x=2\end{cases}$

(d) $f(x)=\begin{cases}\frac{x-2}{x^2-4}, & x\neq 2\\ \frac{1}{6}, & x=2\end{cases}$

(20) On using the definition of derivative, then $f'(x)$ of the function $f(x)=x^3$ is given by

(a) $\lim_{h\to 0}\frac{(x-h)^3+x^3}{h}$

(b) $\lim_{h\to 0}\frac{(x+h)^3-x^3}{h}$

(c) $\lim_{h\to 0}\frac{(x-h)^3-x^3}{h}$

(d) $\lim_{h\to 0}\frac{(x+h)^3+x^3}{h}$

(21) If $y=\pi^2+3$, then $\frac{dy}{dx}=$

(a) $2\pi+3$

(b) π^2

(c) 0

(d) 2π

(22) If $y=x^3+x\tan(x)$, then $\frac{dy}{dx}=$

(a) $3x^2+\tan(x)+x\sec^2(x)$

(b) $3x^2+\cot(x)+x\csc^2(x)$

(c) $3x^2+\tan(x)-x\sec^2(x)$

(d) $3x^2+\cot(x)-x\csc^2(x)$

(23) If $y=(6x+5)^{\frac{4}{3}}$, then $y'=$

(a) $4(6x+5)^{\frac{1}{3}}$

(b) $8(6x+5)^{\frac{1}{3}}$

(c) $12(6x+5)^{\frac{1}{3}}$

(d) $16(6x+5)^{\frac{1}{3}}$

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(30) If $y = \cos(2x)$, then $\frac{d^2y}{dx^2} =$

(a) $-4\sin(2x)$

(b) $-\sin(2x)$

(c) $-4\cos(2x)$

(d) $-\cos(2x)$

(31) $\frac{d}{dx}\left[\sin^2(3x)\right] =$

(a) $2\sin(3x)\cos(3x)$

(b) $3\sin(6x)$

(c) $3\sin(3x)\cos(3x)$

(d) $3\cos(6x)$

(32) Equation of the tangent line to the circle $x^2 + y^2 = 9$ at the point $(0, -3)$ is

(a) $y = -3$

(b) $y = -2$

(c) $y = 2$

(d) $y = 3$

(33) If $x^3 + y^2 = 6$, then $y' =$

(a) $\frac{2x^2}{3y}$

(b) $\frac{-2x^2}{3y}$

(c) $\frac{3x^2}{2y}$

(d) $\frac{-3x^2}{2y}$

Best Wishes

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Faculty of Science
Department of Mathematics

D

Course Code: MATH 101
Academic Year: 1439-1440 H
Academic Term: Second Exam: 2
Exam Pages: 6
No. of Questions: 33
Exam Marks: 30
Exam Time: 90 Minutes
Student Name: ....
ID: ....

Calculator is **NOT** allowed.

(1) $\lim_{x \to -1} \sqrt[3]{x^2 - 7} =$

(a) $\sqrt[3]{-7}$ (b) $\sqrt[3]{-6}$

(c) $\sqrt[3]{-5}$ (d) $\sqrt[3]{-4}$

(2) $\lim_{x \to 0}\left(\frac{x^2 - 6x + 5}{x - 1}\right) =$

(a) −5 (b) 0

(c) 5 (d) −4

(3) $\lim_{x \to 1}\left(\frac{x^2 - 6x + 5}{x - 1}\right) =$

(a) −5 (b) 0

(c) 5 (d) −4

(4) $\lim_{x \to 3}\left(\frac{x - 3}{x^2 - 9}\right) =$

(a) $\frac{1}{2}$ (b) $\frac{1}{4}$

(c) $\frac{1}{6}$ (d) $\frac{1}{8}$

(5) $\lim_{x \to 0}\left(\frac{(x+1)^2 - 1}{2x}\right) =$

(a) 1 (b) 2

(c) 3 (d) 4

(13) $\lim_{x \to 3^+} \left(\frac{7}{x-3} \right) =$

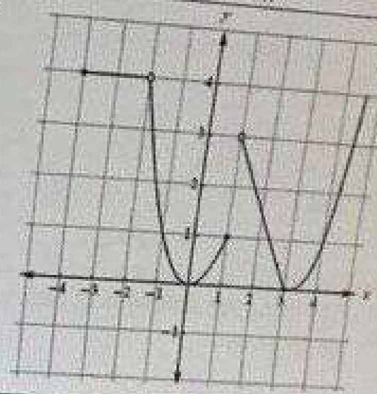
(a) $-\infty$

(b) ∞

(c) 0

(d) does not exist.

(14) Consider the function $y(x)$ in the next figure to find $\lim_{x \to 1^+} y(x)$



(a) 4

(b) 3

(c) 1

(d) 0

(15) The function $f(x) = \frac{x+4}{x^2-25}$ is continuous on the interval

(a) $\mathbb{R}-\{-2,2\}$

(b) $\mathbb{R}-\{-3,3\}$

(c) $\mathbb{R}-\{-4,4\}$

(d) $\mathbb{R}-\{-5,5\}$

(16) At $x=-1$, the function $f(x) = \begin{cases} x^2+5, & x \le -1 \\ 5-x, & x > -1 \end{cases}$ is

(a) right continuous only.

(b) left continuous only.

(c) continuous.

(d) discontinuous.

(17) The value of k that makes the following function

$$f(x) = \begin{cases} x^2+2x-3 & \text{if } x \ne 0 \\ k+\sin(x) & \text{if } x = 0 \end{cases}$$

continuous at $x=0$ is

(a) -4

(b) -3

(c) -2

(d) -1

(18) The function $f(x) = \lfloor x \rfloor$ is right continuous only at $x=3$.

(a) True

(b) False

(6) $\lim_{x \to \frac{3\pi}{2}} (x \sin(x)) =$

(a) $\frac{3\pi}{2}$

(b) $\frac{-3\pi}{2}$

(c) $\frac{\pi}{2}$

(d) $\frac{-\pi}{2}$

(7) $\lim_{x \to 3^+} \left(\frac{|x-3|}{x-3} \right) =$

(a) does not exist.

(b) 3

(c) -1

(d) 1

(8) If $f(x) = \begin{cases} x+2; & x \geq 1 \\ 3x-4; & x < 1 \end{cases}$, then $\lim_{x \to 1^-} f(x) =$

(a) 3

(b) -3

(c) 4

(d) -1

(9) If $\sqrt{6-2x^2} \leq f(x) \leq \sqrt{6-x^2}$, then $\lim_{x \to 0} f(x) =$

(a) $\sqrt{3}$

(b) $\sqrt{5}$

(c) $\sqrt{6}$

(d) $\sqrt{7}$

(10) $\lim_{x \to 6^+} \left(\frac{\lfloor x \rfloor}{2} \right) =$

Note: $\lfloor x \rfloor$ is the greatest integer function.

(a) 3

(b) 2

(c) 1

(d) 0

(11) $\lim_{x \to -\infty} \left(\frac{4x^2 - 3x + 5}{x^2 + 2x - 1} \right) =$

(a) 2

(b) 3

(c) 4

(d) 5

(12) $\lim_{x \to \infty} \left(\frac{3x^2 + 5x - 2}{4x^3 + 7} \right) =$

(a) 0

(b) 3

(c) 4

(d) ∞