Solutions to Limits Worksheet (1)

Question	Answer
1	$-\infty$
2	∞
3	∞
4	$-\infty$
5	2
6	$\frac{1}{2}$
7	Does not exist
8	4
9	0

Solutions to Limits Worksheet (2)

Question	Answer	Question	Answer
1	B	11	A
2	A	12	B
3	C	13	C
4	C	14	A
5	D	15	D
6	C	16	A
7	C	17	B
8	B	18	B
9	A	19	C
10	C	20	A

Solutions to Continuity Worksheet (1)

Question	Answer
1	Discontinuous
2	Continuous
3	Discontinuous
4	Right continuous
5	Continuous
6	Discontinuous
7	Left continuous
8	Continuous
9	Continuous
10	Discontinuous
11	Discontinuous
12	Continuous

Solutions to Continuity Worksheet (2)

Question	Answer
1	B
2	D
3	C
4	C
5	B
6	C
7	A

MATH 110
Continuity
Worksheet (2)

==========

Choose the correct answer:

1. The function $f(x) = \begin{cases} 3x-1 & \text{if } x \leq 1 \\ x^2 & \text{if } x > 1 \end{cases}$ is ..... at $x = 1$.	
(a) continuous	(c) right continuous
(b) left continuous	(d) discontinuous

2. The function $f(x) = \begin{cases} x & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases}$ is ..... at $x = 0$.	
(a) continuous	(c) right continuous
(b) left continuous	(d) discontinuous

3. The function $f(x) = \sqrt{3x-5}$ is continuous on the interval.....	
(a) $\left(-\infty, \frac{5}{3}\right]$	(c) $\left[\frac{5}{3}, \infty\right)$
(b) $\left(-\infty, -\frac{5}{3}\right]$	(d) $\left[-\frac{5}{3}, \infty\right)$

4. The function $f(x) = \lfloor x \rfloor$ is continuous on ..... where n is an integer.	
(a) every interval $(n, n+1]$	(c) every interval $[n, n+1)$
(b) every interval $(n-1, n]$	(d) every interval $[n-1, n)$

5. If $f(x) = \begin{cases} x^2 - k & \text{if } x \leq 6 \\ x & \text{if } x > 6 \end{cases}$ is a continuous function, then $k =$.....

(a) 36	(c) 6
(b) 30	(d) 3

6. The continuous extension of the function $f(x) = \dfrac{x^2 - 2x - 3}{x^2 - 9}$ at $x = 3$ is .....

(a) $F(x) = \begin{cases} \dfrac{x^2 - 2x - 3}{x^2 - 9} & \text{if } x \neq 3 \\ 3 & \text{if } x = 3 \end{cases}$	(c) $F(x) = \begin{cases} \dfrac{x^2 - 2x - 3}{x^2 - 9} & \text{if } x \neq 3 \\ \dfrac{2}{3} & \text{if } x = 3 \end{cases}$
(b) $F(x) = \begin{cases} \dfrac{x^2 - 2x - 3}{x^2 - 9} & \text{if } x \neq 3 \\ 0 & \text{if } x = 3 \end{cases}$	(d) $F(x) = \begin{cases} \dfrac{x^2 - 2x - 3}{x^2 - 9} & \text{if } x \neq 3 \\ -3 & \text{if } x = 3 \end{cases}$

7. Which of the following functions has a removable discontinuity at $x = 1$?

(a) $g(x) = \begin{cases} x & \text{if } x \neq 1 \\ -1 & \text{if } x = 1 \end{cases}$	(c) $g(x) = \begin{cases} x & \text{if } x < 1 \\ -1 & \text{if } x > 1 \end{cases}$
(b) $g(x) = \begin{cases} x & \text{if } x < 1 \\ -1 & \text{if } x \geq 1 \end{cases}$	(d) $g(x) = \begin{cases} x & \text{if } x > 1 \\ -1 & \text{if } x \leq 1 \end{cases}$

By: Asmaa Melaibari amelaibari@uj.edu.sa

MATH 110
Differentiation
Worksheet (1)

==========

Choose the correct answer:

1. The function $f(x) = \|x\|$ has a ..... at $x = 0$.	
(a) vertical tangent line	(c) nonvertical tangent line
(b) horizontal tangent line	(d) no tangent line

2. The function $f(x) = x^3 + 5$ has a ..... at the point $(1, 6)$.	
(a) vertical tangent line	(c) nonvertical tangent line
(b) horizontal tangent line	(d) no tangent line

3. The derivative formula of the function $f(x) = x^2 + 1$ is $f'(x) =$.....	
(a) $\lim_{h\to 0} \dfrac{(x^2+h+1)-(x^2+1)}{h}$	(c) $\lim_{h\to 0} \dfrac{(x+h)^2+1-(x^2+1)}{h}$
(b) $\lim_{h\to 0} \dfrac{(x+h+1)^2-(x^2+1)}{h}$	(d) $\lim_{h\to 0} \dfrac{(x^2+h)^2+1-(x^2+1)}{h}$

4. The derivative of the function $f(x) = 5x^6 + x^3 + 1$ is	
(a) $f'(x) = 6x^5 + 3x^2$	(c) $f'(x) = 30x^5 + 3x + 1$
(b) $f'(x) = 11x^5 + 3x^2$	(d) $f'(x) = 30x^5 + 3x^2$

5. The derivative of the function $f(x) = \dfrac{2x+1}{x+2}$ is	
(a) $f'(x) = \dfrac{2}{(x+2)^2}$	(c) $f'(x) = \dfrac{5}{(x+2)^2}$
(b) $f'(x) = \dfrac{3}{(x+2)^2}$	(d) $f'(x) = \dfrac{3x+2}{(x+2)^2}$

6. The derivative of the function $f(x) = \dfrac{1}{4x}$ is	
(a) $f'(x) = -\dfrac{1}{4x^2}$	(c) $f'(x) = \dfrac{1}{4}$
(b) $f'(x) = -\dfrac{1}{16x^2}$	(d) $f'(x) = 4$

7. $\dfrac{d}{dx}\left(\dfrac{x^5+2x^4+3x^2+1}{x}\right) =$	
(a) $4x^3 + 6x^2 + 3 + \dfrac{1}{x^2}$	(c) $4x^3 + 6x^2 + 3 - \dfrac{1}{x^2}$
(b) $5x^2 + 8x + \dfrac{6}{x}$	(d) $4x^3 + 6x^2 + 4$

8. If $f(x) = x^{5/2} + 2x^{3/2} + 4$, then $f'(x) =$	
(a) $\dfrac{5}{2}\, x^2 + 3x$	(c) $\dfrac{5}{2}\, x^{3/2} + 3x^{1/2}$
(b) $\dfrac{5}{2}\, x^3 + 3x$	(d) $\dfrac{5}{2}\, x^{3/2} + \dfrac{3}{2}\, x^{1/2}$

9. $\dfrac{d}{dx}\left(\dfrac{4x}{1+x^2}\right)\Big\vert_{x=2} =$	
(a) $\dfrac{12}{25}$	(c) $\dfrac{12}{5}$
(b) $-\dfrac{12}{25}$	(d) $-\dfrac{12}{5}$

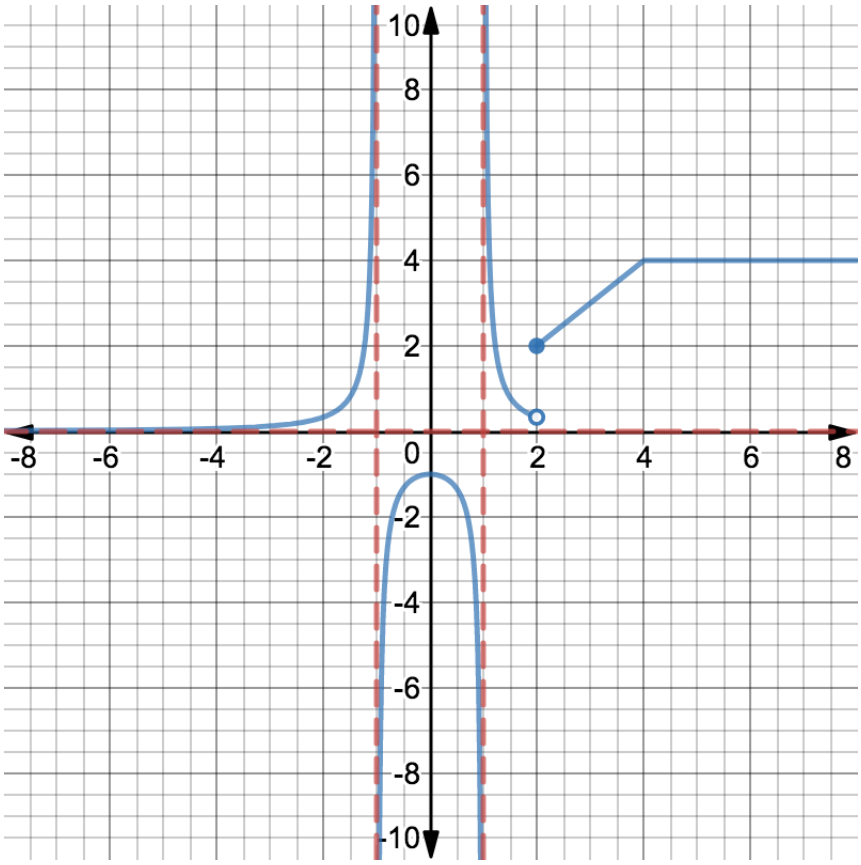
10. The equation of the tangent line to $f(x) = x^2 + 2x$ at $x = 4$ is	
(a) $y = 10x + 64$	(c) $y = 10x + 16$
(b) $y = 10x - 64$	(d) $y = 10x - 16$

11. The equation of the normal line to $f(x) = \sqrt{x}$ at $x = 9$ is	
(a) $y = -6x + 57$	(c) $y = 6x + 57$
(b) $y = \frac{1}{6}x + 57$	(d) $y = -\frac{1}{6}x + 57$

By: Asmaa Melaibari amelaibari@uj.edu.sa

MATH 110
Limits of Functions
Worksheet (1)

==========



Use the above graph of the function $f(x)$ to find the following limits:

1. $\lim\limits_{x\to -1^+} f(x) =$ .....
2. $\lim\limits_{x\to -1^-} f(x) =$ .....
3. $\lim\limits_{x\to 1^+} f(x) =$ .....
4. $\lim\limits_{x\to 1^-} f(x) =$ .....
5. $\lim\limits_{x\to 2^+} f(x) =$ .....
6. $\lim\limits_{x\to 2^-} f(x) =$ .....
7. $\lim\limits_{x\to 2} f(x) =$ .....
8. $\lim\limits_{x\to \infty} f(x) =$ .....
9. $\lim\limits_{x\to -\infty} f(x) =$ .....

MATH 110
Limits of Functions
Worksheet (2)

==========

Choose the correct answer:

1. $\lim_{x\to 5} 6 =$			
(a) 5	(b) 6	(c) ∞	(d) $-\infty$
2. $\lim_{x\to 0} x^2 - 1 =$			
(a) -1	(b) 0	(c) 1	(d) ∞
3. $\lim_{x\to 0} \frac{1}{x^2} =$			
(a) 0	(b) 2	(c) ∞	(d) $-\infty$
4. $\lim_{x\to 3} \frac{x^2-4x+3}{x-3} =$			
(a) 0	(b) 1	(c) 2	(d) ∞
5. $\lim_{x\to \infty} \frac{3x^3-2x+5}{x-3} =$			
(a) 0	(b) 1	(c) 2	(d) ∞
6. $\lim_{x\to \infty} \frac{2x+5}{x-3} =$			
(a) 0	(b) 1	(c) 2	(d) ∞
7. $\lim_{x\to 3^+} \frac{x+2}{x^2-9} =$			
(a) 0	(b) 1	(c) ∞	(d) $-\infty$

8. $\lim\limits_{x\to 9} \dfrac{\sqrt{x}-3}{x^2-9x}$ = ...

(a) 0	(b) $\frac{1}{54}$	(c) $\frac{1}{81}$	(d) ∞

9. $\lim\limits_{x\to 0} \dfrac{2x}{\sqrt{9-x}-\sqrt{9+x}}$ = ...

(a) -6	(b) -3	(c) 3	(d) 6

10. $\lim\limits_{x\to -\infty} \dfrac{\sqrt{9x^2+2}}{12x}$ = ...

(a) $\frac{1}{4}$	(b) $\frac{3}{4}$	(c) $-\frac{1}{4}$	(d) $-\frac{3}{4}$

11. $\lim\limits_{x\to \infty} \dfrac{\sqrt{x^2+2x}-x}{2}$ = ...

(a) $\frac{1}{2}$	(b) 1	(c) 2	(d) ∞

12. $\lim\limits_{x\to 6^+} \dfrac{|x-6|}{x^2-4x-12}$ = ...

(a) 0	(b) $\frac{1}{8}$	(c) $-\frac{1}{8}$	(d) ∞

13. $\lim\limits_{x\to 2^-} \dfrac{|x-2|}{x^2-4}$ = ...

(a) 0	(b) $\frac{1}{4}$	(c) $-\frac{1}{4}$	(d) $-\infty$

14. If $2x \le f(x) \le x^4 - x^2 + 2$, then $\lim\limits_{x\to 1} f(x)$ = ...

(a) 2	(b) 3	(c) ∞	(d) $-\infty$

15. Let $f(x) = \begin{cases} x-1 & \text{if } x \le 1 \\ 3x^2 & \text{if } x > 1 \end{cases}$ be a function. Then, $\lim\limits_{x\to 1} f(x)$ = ...

(a) 0	(b) 1	(c) 3	(d) dose not exist

16. Let $f(x) = \begin{cases} x-1 & \text{if } x \leq 1 \\ 3x^2 & \text{if } x > 1 \end{cases}$ be a function. Then, $\lim\limits_{x \to 1^-} f(x) =$ .....

(a) 0	(b) 1	(c) 3	(d) dose not exist

17. Let $f(x) = \begin{cases} x-1 & \text{if } x \neq 3 \\ -2 & \text{if } x = 3 \end{cases}$ be a function. Then, $\lim\limits_{x \to 3} f(x) =$ .....

(a) -2	(b) 2	(c) 3	(d) dose not exist

18. If $\lim\limits_{x \to 2} f(x) = -4$ and $\lim\limits_{x \to 2} g(x) = 3$, then $\lim\limits_{x \to 2} \dfrac{2f(x)+5}{g(x)} =$ .....

(a) 1	(b) -1	(c) $\frac{13}{3}$	(d) $-\frac{13}{3}$

19. $\lim\limits_{x \to -\infty} (5x^6 - 9x^2 + 2) =$ .....

(a) 5	(b) 6	(c) ∞	(d) $-\infty$

20. $\lim\limits_{x \to 5^-} \lfloor x \rfloor =$ .....

(a) 4	(b) 5	(c) 6	(d) does not exist

University of Jeddah

Faculty of Science

Department of Mathematics

Academic Term:2- 1438/1439 H

Course Code: MATH 101

Quiz Time: 15 Minutes

(1) The absolute maximum point of $f(x)=x^2-2x$ on [-1,2] is

نوجد المشتقة الاولى ثم نساويها بالصفر لايجاد قيمة x

$$f'(x)=2x-2$$
$$2x-2=0$$
$$2x=2$$
$$x=1$$

نعوض عن قيمة x واطراف الفترة لتحديد القيمة العظمى المطلقة (ذات الناتج الاكبر) والقيمة الصغرى المطلقة (ذات الناتج الاصغر)

$f(1)=(1)^2-2(1)=1-2=-1 \rightarrow AbsMinimum$

$f(-1)=(-1)^2-2(-1)=1+2=3 \rightarrow AbsMaximum$

$f(2)=(2)^2-2(2)=4-4=0$

Absolute Maximum at (-1 , f(-1)) = (-1,3)
Absolute Minimum at (1 , f(1)) = (1,-1)

(2) The absolute minimum point of $f(x)=x^2-2x$ on [-1,2] is

Absolute Minimum at (1 , f(1)) = (1,-1)

(3) The critical numbers of $f(x)=2x^3-3x^2-12x+3$ are -1,2

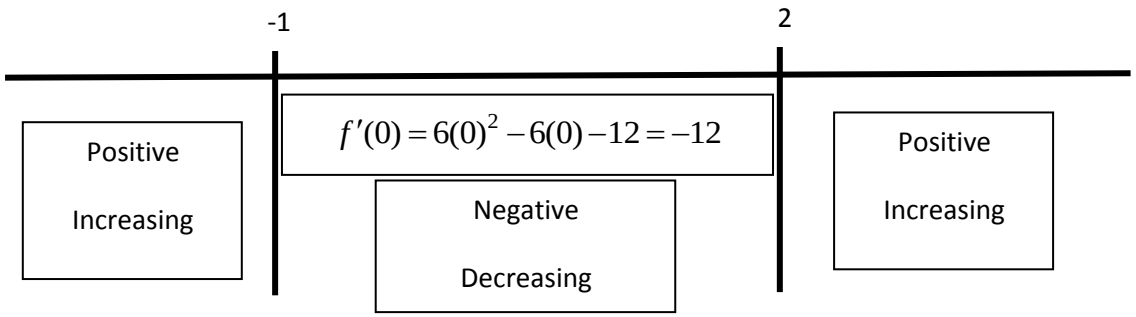
نوجد المشتقة الاولى ثم نساويها بالصفر لايجاد قيمة x

$$f'(x) = 6x^2 - 6x - 12$$
$$6x^2 - 6x - 12 = 0$$
$$\frac{6}{6}x^2 - \frac{6}{6}x - \frac{12}{6} = \frac{0}{6}$$
$$x^2 - x - 2 = 0$$
$$(x-2)(x+1) = 0$$
$$either$$
$$x - 2 = 0 \rightarrow x = 2$$
$$or$$
$$x + 1 = 0 \rightarrow x = -1$$

النقاط الحرجة هي 1,2-

(4) The function $f(x) = 2x^3 - 3x^2 - 12x + 3$ is increasing on

نمثل 1,2- على خط الاعداد ونختبر الاشارة بكل فترة بالتعويض عن القيم الاختيارية في المشتقة الاولى



F is increasing on $(-\infty, -1) \cup (2, \infty)$

(5) The function $f(x) = 2x^3 - 3x^2 - 12x + 3$ is decreasing on

F is decreasing on $(-1, 2)$

(6) The function $f(x) = 2x^3 - 3x^2 - 12x + 3$ has a local maximum at the point

التغيير من تزايدية الى تناقصية تعتبر نقطة عظمى محلية

Local maximum at (-1, f(-1)) = (-1,10)

(7) The function $f(x)=2x^3-3x^2-12x+3$ has a local minimum at the point

التغيير من تناقصية الى تزايدية تعتبر نقطة صغرى محلية

Local minimum at (2, f(2)) = (2,-17)

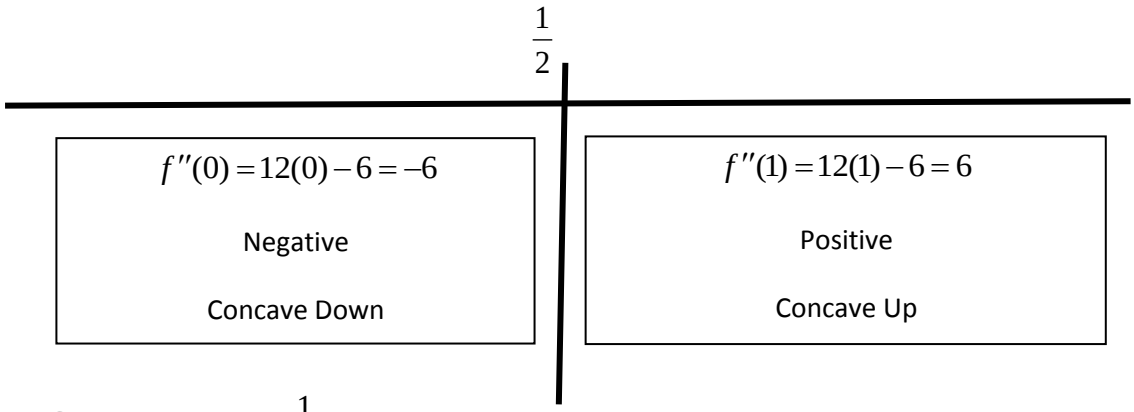
(8) The function $f(x)=2x^3-3x^2-12x+3$ has an inflection point at

نوجد المشتقة الثانية ثم نساويها بالصفر لايجاد قيمة x

$$f''(x)=12x-6$$
$$12x-6=0$$
$$\frac{12}{12}x=\frac{6}{12}$$
$$x=\frac{1}{2}$$

Inflection point at $(\frac{1}{2}, f(\frac{1}{2}))=(\frac{1}{2},-\frac{7}{2})$

(9) The graph of the function $f(x)=2x^3-3x^2-12x+3$ is concave up on



F is Concave up on $(\frac{1}{2},\infty)$

(10) The graph of the function $f(x)=2x^3-3x^2-12x+3$ is concave down on

F is Concave down on $(-\infty,\frac{1}{2})$