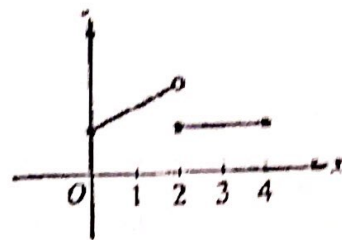


M. Item

1.) If  $\lim_{x \rightarrow 2^+} f(x) = 7.5$ , then if  $\lim_{x \rightarrow 2} f(x)$  exists, to what value does it converge?

6.)



Graph of f

The figure above shows the graph of the function f with domain  $0 \leq x \leq 4$ . Which of the following statements are true?

- I.  $\lim_{x \rightarrow 2^-} f(x)$  exists
- II.  $\lim_{x \rightarrow 2^+} f(x)$  exists
- III.  $\lim_{x \rightarrow 2} f(x)$  exists

- a.) I only
- b.) II only
- c.) I & II only
- d.) I, II, & III

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

b.)  $\lim_{x \rightarrow \infty} \frac{3x+5}{x-4} =$

c.)  $\lim_{x \rightarrow \infty} x^4 + x^5 =$

d.)  $\lim_{n \rightarrow \infty} \frac{3n^3 - 5n}{n^3 - 2n^2 + 1} =$

3.)  $f(x) = \begin{cases} \frac{x^2 - 4}{x - 2} & \text{if } x \neq 2 \\ 1 & \text{if } x = 2 \end{cases}$

Let f be the function defined above. Which of the following statements are true?

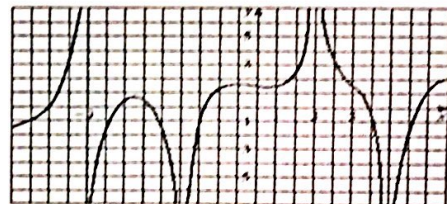
- I. f has a limit at  $x=2$
- II. f is continuous at  $x=2$
- III.  $\lim_{x \rightarrow 2} f(x) = f(2)$

- a.) II & III
- b.) II only
- c.) I only
- d.) All of the above

4.) For the function f whose graph is shown, find the limits:

i.)  $\lim_{x \rightarrow 3} f(x) =$       ii.)  $\lim_{x \rightarrow -9^-} f(x) =$

iii.)  $\lim_{x \rightarrow -\infty} f(x) =$       iv.)  $\lim_{x \rightarrow \infty} f(x) =$



5.) Find the slope of the tangent line to the curve  $y = x^2 + 3x$  at the point (4, 28).

$y - 28 = -2/3(x - 4)$

7.) If a ball is thrown into the air with a velocity of 45 ft/s, its height in feet after t seconds is given by  $y = 45t - 15t^2$ . Find the average velocity over the interval [0, 4]. Find the instantaneous velocity when  $t = 4$ .

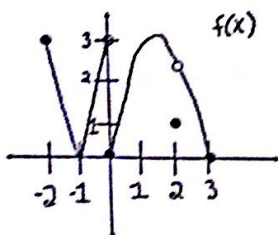
8.)  $\lim_{x \rightarrow \infty} \frac{x^4 + 2x^2 - 6}{6x^4} =$

9.)  $\lim_{x \rightarrow 3} \frac{x-3}{|x-3|} =$

10.)  $\lim_{x \rightarrow 2} \frac{1}{(x-2)^2} =$

11.)  $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x^2 + 2x - 3} =$

12.) State, with reasons, the number(s) at which f is not differentiable.



13.) If  $f(x) = x^2 - 2x$ , which of the following represents  $f'(1)$ ?

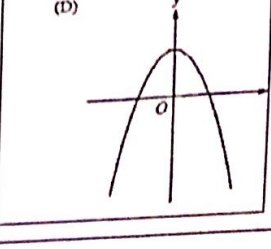
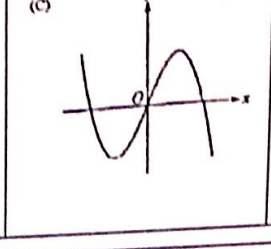
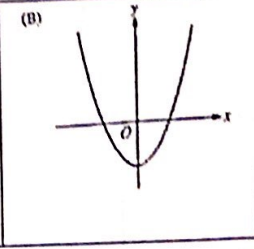
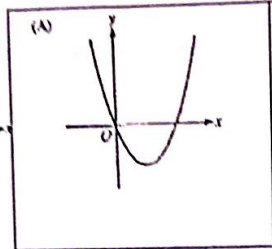
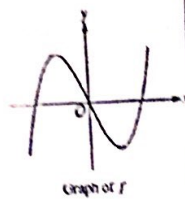
a.)  $\lim_{h \rightarrow 0} \frac{(1+h)^2 - 2(1+h) - 1}{h} =$

c.)  $\lim_{h \rightarrow 0} \frac{(1+h)^2 - 2(1+h) + 1}{h} =$

b.)  $\lim_{h \rightarrow 1} \frac{(1+h)^2 - 2(1+h) + 1}{h} =$

d.)  $\frac{(1+h)^2 - 2(1+h) + 1}{h} =$

14) Given the graph of  $f(x)$ , which of the following best represents  $f'(x)$ ?



Find the first derivative of the following functions

15.)  $f(x) = \sqrt{30}$

16.)  $f(x) = \sqrt{3-2x}$

17.)  $f(x) = x^6 - 3x^4 + x + 3$

18.)  $f(x) = (5x+5)^2$

19.)  $f(x) = \sqrt[3]{t} + 4\sqrt{t}$

20.)  $f(x) = (x^9 + 4x^2 + 3x + 2)(x^6 + 4x^3)$

21.)  $f(x) = 3x^{\frac{2}{3}} - 4x^{\frac{1}{2}} - 2$

22.)  $f(x) = \frac{2-x}{3x+1}$

23.)  $f(x) = 3 \cot 4x$

24.)  $f(x) = \csc x + \sec x$

25.)  $f(x) = -3x^2 + 2 \tan x$

26.)  $f(x) = (x-1)(x^2+2)^3$

27.)  $f(x) = \left(\frac{x+3}{x^2+6}\right)^8$

28.)  $f(x) = 3 \sin^2(5x^2-3)$

29.)  $f(x) = \frac{1}{x^7}$

30.) If  $f(x) = \cos(3x)$ , then  $f'\left(\frac{\pi}{9}\right) =$

31.) Find the value(s) of  $x$  where the graph of  $f(x) = 2x^3 + 3x^2 - 36x + 7$  has a horizontal tangent line.

32.) Find the slope of the tangent line to the graph of the function at a given point.

$f(x) = -3x^2 + 7$        $(-2, -5)$

33.) Find the equation of the tangent line to the curve at the given point.

$f(x) = \frac{\sqrt{x}}{x+6}$        $(4, 0.2)$

Find the second derivative

34.)  $f(x) = \frac{6x^2 + 7x - 4}{x}$

35.)  $f(x) = x^4 \sin x$

36.) The position function of a particle is given by  $s(t) = t^3 - 1.5t^2 - 2t$  with  $t \geq 0$ . When does the particle reach a velocity of 166 m/s?

37.) The equation of motion is given for a particle where  $s$  is in meters and  $t$  is in seconds. Find the acceleration of the particle after 4.5 seconds.

$s(t) = \sin(2\pi t)$

38.) The first derivative of the function  $f$  is given by  $f'(x) = \frac{\cos^2 x}{x} - \frac{1}{5}$ . How many critical values does  $f$  have on the open interval  $(0, 10)$ ?

a.) One	b.) Three
c.) Four	d.) Five
e.) Seven	

39.) For what value of  $x$  does the function  $f(x) = (x-2)(x-3)^2$  have a relative maximum?

a.) -3	b.) $-\frac{7}{3}$	c.) $-\frac{5}{2}$	d.) $\frac{7}{3}$	e.) $\frac{5}{2}$
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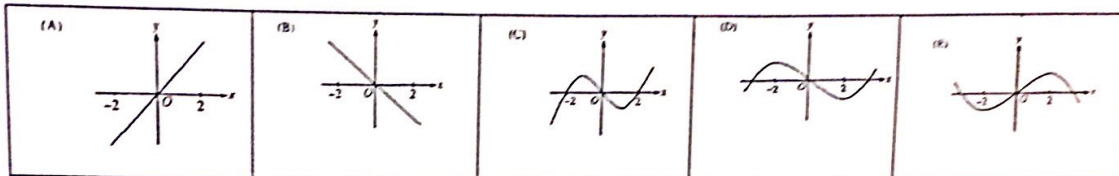
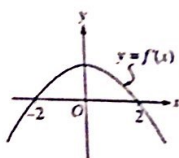
41.) If  $f(x) = \frac{1}{3}x^3 - 4x^2 + 12x - 5$  and the domain is set of all  $x$  such that  $0 \leq x \leq 9$ , then the absolute maximum value of the function of  $f$  occurs when  $x$  is

a.) 0	b.) 2	e.) 9
c.) 4	d.) 6	

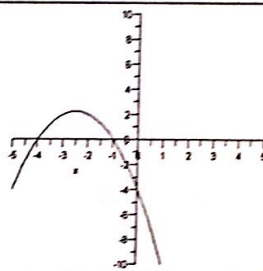
42.) What are all the values of  $x$  for which the function  $f$  defined by  $f(x) = x^3 + 3x^2 - 9x + 7$  is increasing?

a) $-3 < x < 1$	b) $-1 < x < 1$
c) $x < -3$ or $x > -1$	d) $x < -1$ or $x > 3$
e) All Real Numbers	

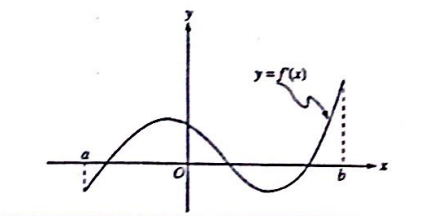
43.) Given the graph of  $f'(x)$ , which of the following best represents  $f(x)$ ?



45) Find the critical values of  $f(x) = x^3 - 9x^2 + 24x + 4$



46.) The derivative of  $f$  is graphed on the left. Give a value of  $x$  where  $f$  has a local maximum



47.) The graph of  $f'$ , the derivative of  $f$ , is shown in the figure on the left. Which of the following describes all relative extrema on the open interval  $(a, b)$ ?

a) One relative maximum and two relative minima
b) Two relative maxima and one relative minimum
c) Three relative maxima and one relative minimum
d) One relative maximum and three relative minima
e) Three relative maxima and two relative minima

48.)  $\int \frac{1}{x^2} dx$

49.)  $\int (\sin(2x) + \cos(2x)) dx$

50.)  $\int_{-1}^1 (x^2 - x - 1) dx$

51.)  $\int_0^{\sqrt{3}} \frac{x}{\sqrt{4-x^2}} dx$

52.)  $\int_0^1 (2x^2 - 1)^3 dx$

53.)  $\int_0^1 (3 + x\sqrt{x}) dx$

54.)  $\int \sec x (\sec x + \tan x) dx$

55.)  $\int \cos x \sin^6 x dx$