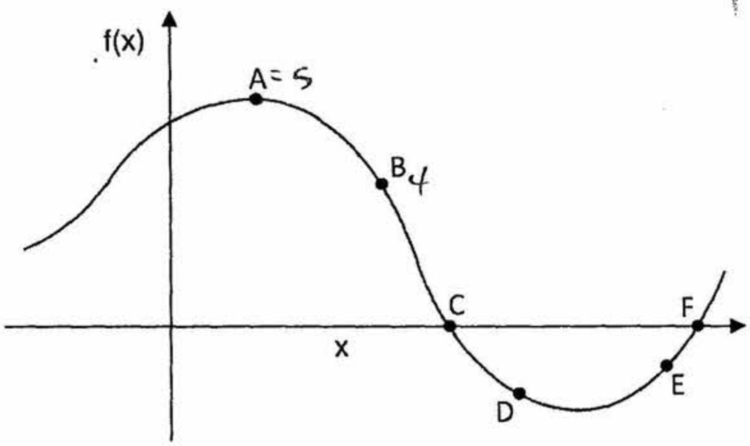
Use the following graph to answer questions 1 through 3.

f(x) = 5 A = 5



1. At point **F**

   (a) $f(x)$ is negative and $f'(x)$ is zero

   (b) $f(x)$ is zero and $f'(x)$ is negative

   (c) $f(x)$ is positive and $f'(x)$ is zero

   (d) $f(x)$ is zero and $f'(x)$ is positive

   (e) none of the above

2. $f'(x)$ at point **A** is greater than

   (a) $f'(x)$ at point **B**

   (b) $f'(x)$ at point **E**

   (c) $f'(x)$ at point **F**

   (d) all of the above

   (e) none of the above

3. At point **B**

   (a) $f(x)$ is positive and $f'(x)$ is negative

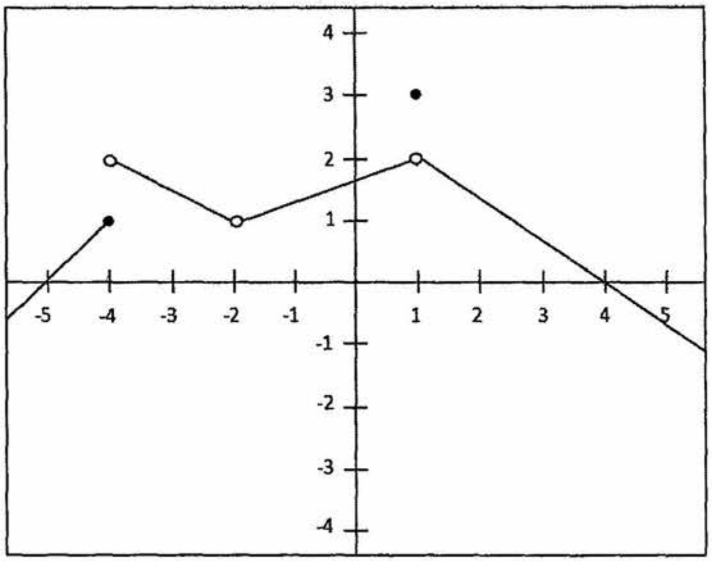
   (b) $f(x)$ is negative and $f'(x)$ is positive

   (c) $f(x)$ is negative and $f'(x)$ is negative

   (d) $f(x)$ is positive and $f'(x)$ is positive

   (e) none of the above

Use the following graph to answer questions 4 through 8.



4. $\lim_{x \to 1} f(x) =$
   (a) 2
   (b) 3
   (c) does not exist (or undefined)
   (d) none of the above

5. $\lim_{x \to -4^-} f(x) =$
   (a) 1
   (b) 2
   (c) does not exist (or undefined)
   (d) none of the above

6. $\lim_{x \to -4^+} f(x) =$
   (a) 1
   (b) 2
   (c) does not exist (or undefined)
   (d) none of the above

7. $\lim_{x \to -4} f(x) =$
   (a) 1
   (b) 2
   (c) does not exist (or undefined)
   (d) none of the above

8. $f(-4) =$
   (a) 1
   (b) 2
   (c) does not exist (or undefined)
   (d) none of the above

9. $\lim_{x \to 5} \left(\frac{x^2 + 8x + 15}{x^2 + 2x - 15} \right) =$

$\left(\frac{x^2+8x+15}{x^2+2x-15}\right.$ $\frac{(5)^2+8x+15}{(5)^2+2x-15}$

$25+8(5)+15$ $\frac{80}{20}$

$\sqrt{x}$ $x^{\frac{1}{2}}$

(a) 0
(b) 4
(c) 5
(d) does not exist (or undefined)
(e) none of the above

10. $\lim_{x \to 1} \left(\frac{1 - \sqrt{x}}{x - 1} \right) =$ $\frac{1-\sqrt{1}}{1-1}$ $1-\frac{1}{2}(1)$ $1^{(\frac{1}{2})}$

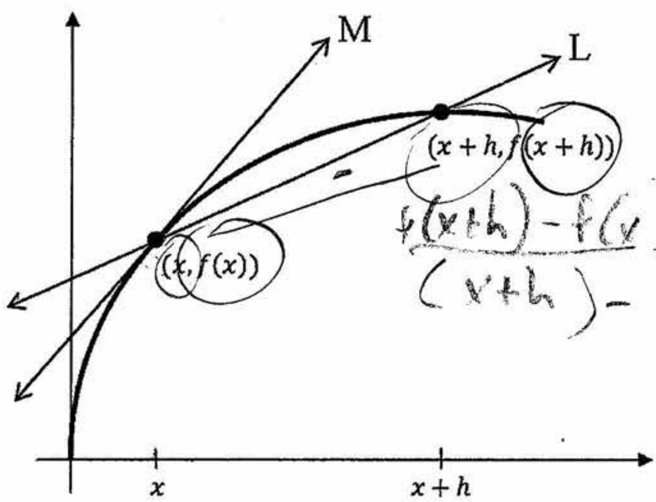
$1-\sqrt{1}$ $\underline{-\frac{1}{2}}$

(a) -1/2
(b) 1/2
(c) 0
(d) does not exist (or undefined)
(e) none of the above

11. $\lim_{x \to 3} \left(\frac{x^2 + x - 12}{x - 3} \right) =$ $\underline{0}$

(a) 7
(b) 0
(c) 4
(d) does not exist (or undefined)
(e) none of the above

Use the following graph to answer questions 12 and 13.



$f(x+h)$

$\dfrac{f(x+h) - f(x)}{(x+h) - x}$

12. Which formula below is a formula for the **slope** of the line **L**?

(a) $\dfrac{f(x+h)}{(x+h)}$

(b) $\dfrac{f(x+h)-f(x)}{(x+h)-x}$

(c) $\dfrac{f(x)+h-f(x)}{(x+h)-x}$

(d) $\dfrac{f(x)-f(x+h)}{(x+h)-x}$

(e) $\dfrac{f(x)}{x}$

check

13. Which formula below is a formula for the **slope** of the tangent line **M**?

(a) $\lim\limits_{h\to 0} \dfrac{f(x+h)}{(x+h)}$

(b) $\lim\limits_{h\to 0} \dfrac{f(x+h)-f(x)}{(x+h)-x}$

(c) $\lim\limits_{h\to 0} \dfrac{f(x)+h-f(x)}{(x+h)-x}$

(d) $\lim\limits_{h\to 0} \dfrac{f(x)-f(x+h)}{(x+h)-x}$

(e) $\lim\limits_{h\to 0} \dfrac{f(x)}{x}$

Quo: 1st d. + 1st · 2nd d

14. If $f(x) = \sqrt[3]{2x^2 - x}$, then $f'(x) =$

(a) $\frac{1}{3}(2x^2 - x)^{-2/3}$

(b) $\frac{1}{3}(4x - 1)^{-2/3}$

(c) $\frac{1}{3}(2x^2 - x)^{-2/3}(4x - 1)$

(d) $\frac{1}{3}(2x^2 - x)^{-1/3}(4x - 1)$

(e) none of the above

$3\sqrt{2x^2 - x}$ $\quad -\frac{1}{2}$

$\frac{1}{3}(2x^2 - x)$

$\frac{1}{3}(4x-1)^{-2/3}$

$\frac{1}{3}(2x^2 - x)^{\frac{1}{2}-\frac{2}{2}}$

$\frac{1}{3}(2x^2 - x)^{-3}$

15. If $f(x) = (x^2 + 1)^3$, then $f'(x) =$

(a) $3(x^2 + 1)^2(2x)$

(b) $3(x^2 + 1)^2$

(c) $3(2x)^2$

(d) $3(x^2 + 1)^2(2)$

(e) none of the above

$(x^2+1)^3$ $\quad 3(x^2+1)^2$

16. If $f(x) = 2x\sqrt{x + 1}$, then $f'(x) =$

(a) $2(x + 1)^{1/2} + x(x + 1)^{-1/2}$

(b) $2(x + 1)^{-1/2} + x(x + 1)^{-1/2}$

(c) $x(x + 1)^{-1/2}$

(d) $(x + 1)^{-1/2}$

(e) none of the above

$(2)(x+1) + (x)(x+1)$

17. If $f(x) = \dfrac{3x - 10}{x^2 + 1}$, then $f'(x) =$

(a) $\dfrac{2x(3x - 10) - 3(x^2 + 1)}{(x^2 + 1)^2}$

(b) $\dfrac{3(x^2 + 1) - 2x(3x - 10)}{(x^2 + 1)^2}$

(c) $\dfrac{3(x^2 + 1) + 2x(3x - 10)}{(x^2 + 1)^2}$

(d) $\dfrac{3}{2x}$

(e) none of the above

$\dfrac{\text{low} \cdot d\,\text{high} - \text{high} \cdot d\,\text{low}}{(\text{low})^2}$

$\dfrac{(3x-10)}{(x^2+1)}$

$\dfrac{3(x^2+1) - (3x-10)(2x)}{(x^2+1)^2}$

$(x+h)(x+h)$
$x^2+xh+xh+h^2$
$x^2+2xh+h^2$

$2(x+h^2)-5(x+h)$

$$\frac{2x^2+2xh+h^2-5x-5h-(2x^2-5x)}{h}$$

18. For $f(x) = 2x^2 - 5x$, what is $\dfrac{f(x+h) - f(x)}{h}$

   (a) $\dfrac{4xh + 2h^2 - 5h}{h}$
   (b) $\dfrac{-10x + h}{h}$
   (c) $\dfrac{4xh + 2h^2 - 5x}{h}$
   (d) $\dfrac{2xh + 2h^2 - 5h}{h}$
   (e) none of the above

$y-y_1 = m(x-x_1)$

19. Let $f(x) = 5x - x^3$. The equation of the tangent line to $f(x)$ at the point $(2, 2)$ is

   (a) $y = 7x - 16$
   (b) $y = 2x - 2$
   (c) $y = -7x + 16$
   (d) $y = -7x - 16$
   (e) none of the above

$5x-x^3$
$5(2)-(2)^3$
$10-8$
$=2$

$5-3x^2$
$5-3(2)^2$
$(2, -7)$

$y-2=-7(x-2)$
$y-2=-7x+14$
$+2 \quad +2$
$y=-7x+16$

20. If $f(x) = x^4 - 3x^3 + x - 2$, then $f''(2) =$

   (a) 48
   (b) 16
   (c) 12
   (d) -10
   (e) none of the above

$4x^2-9x^2+1$

$16-36+1$

$-20+1$