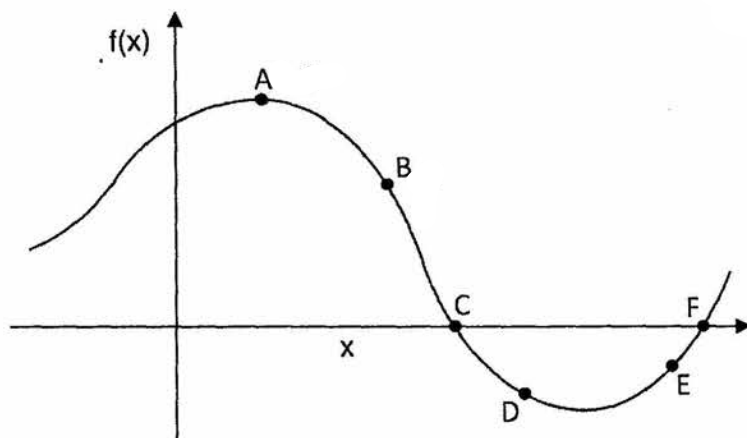


Use the following graph to answer questions 1 through 3.



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

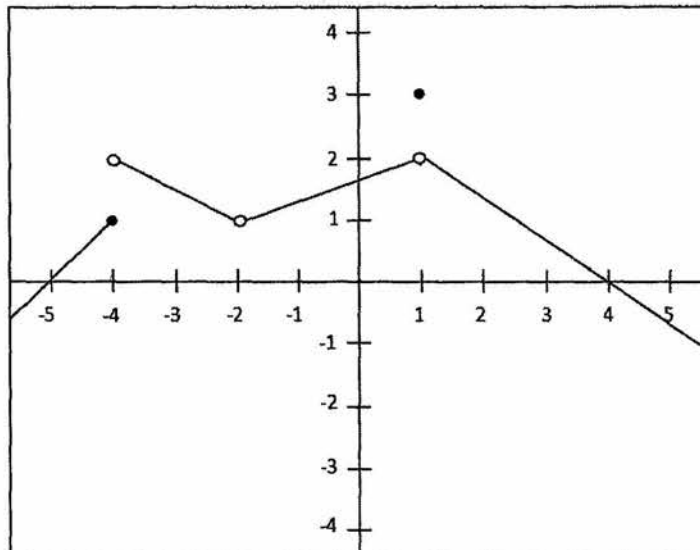
2. $f'(x)$ at point A is greater than

- (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. $\lim_{x \rightarrow 1} f(x) =$

- (a) 2
- (b) 3
- ☒ (c) does not exist (or undefined)
- (d) none of the above

5. $\lim_{x \rightarrow -4^-} f(x) =$

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

6. $\lim_{x \rightarrow -4^+} f(x) =$

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

7. $\lim_{x \rightarrow -4} f(x) =$

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

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

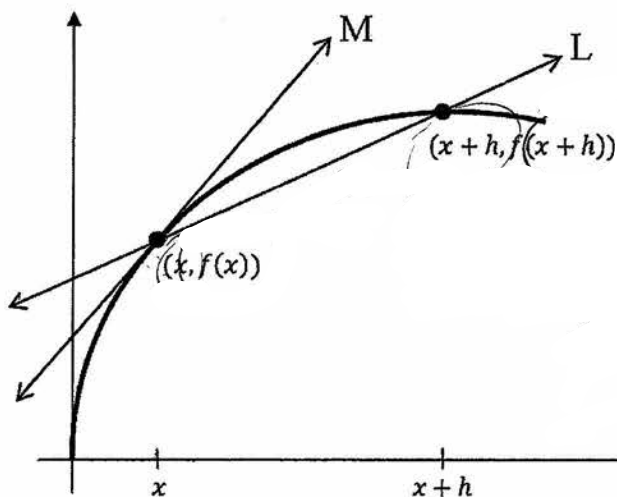
10. $\lim_{x \rightarrow 1} \left(\frac{1 - \sqrt{x}}{x - 1} \right) =$

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

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

- (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.



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

- (a) $\frac{f(x+h)}{(x+h)}$
- (b) $\frac{f(x+h) - f(x)}{(x+h) - x}$
- (c) $\frac{f(x) + h - f(x)}{(x+h) - x}$
- (d) $\frac{f(x) - f(x+h)}{(x+h) - x}$
- (e) $\frac{f(x)}{x}$

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

- (a) $\lim_{h \rightarrow 0} \frac{f(x+h)}{(x+h)}$
- (b) $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{(x+h) - x}$
- (c) $\lim_{h \rightarrow 0} \frac{f(x) + h - f(x)}{(x+h) - x}$
- (d) $\lim_{h \rightarrow 0} \frac{f(x) - f(x+h)}{(x+h) - x}$
- (e) $\lim_{h \rightarrow 0} \frac{f(x)}{x}$

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

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

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

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

- (a) $\frac{2x(3x - 10) - 3(x^2 + 1)}{(x^2 + 1)^2}$
- (b) $\frac{3(x^2 + 1) - 2x(3x - 10)}{(x^2 + 1)^2}$
- (c) $\frac{3(x^2 + 1) + 2x(3x - 10)}{(x^2 + 1)^2}$
- (d) $\frac{3}{2x}$
- (e) none of the above

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

(a) $\frac{4xh + 2h^2 - 5h}{h}$

(b) $\frac{-10x + h}{h}$

(c) $\frac{4xh + 2h^2 - 5x}{h}$

(d) $\frac{4xh + 2h^2 - 5h}{h}$

(e) none of the above

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

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