Choose the correct answer from the given alternatives

1. Let G (x) = f$\left(\frac{3x^2+1}{x-1}\right)$ where f is differentiable function on R/ {1}. If $f'(0)=0$ $f'(-1)=2$ and $f'(3)=-3$, then what is $G'(0)$?

   A) -2 B) -1 C) 0 D) 3

2. Let f(x) = g ($\sqrt{4x+1}$). If $g'(3)=\frac{1}{2}$,then$f'(2)$ is equal to:-

   A) $\frac{2}{3}$ B) $\frac{1}{3}$ C) $\frac{1}{2}\sqrt{5}$ D) $\frac{1}{2}\sqrt{13}$

3. If f(x) = 1-x, g(x) = x^2 + 2 and h (x) = $\frac{f(x)}{g(x)}+g(f(x))$, then h′(0)=

   A) $\frac{3}{2}$ B) $\frac{-3}{2}$ C)$\frac{5}{2}$ D)$\frac{-5}{2}$

4. If g(x) = $\frac{f(x)}{x+1}$ + $(f(x))^2$, f(1) = 8 and $f'(1)$ = 2, then $g'(1)$ is equal

   A) 25 B) 36 C) 31 D) 16

5. If f (2) = -3, f' (2) = 4, g(1) = -5 , $g'(1)$ = 1 and F(x)= f(2x +2).g (1- x^2).Which of the following is the value of F' (0)?

   A) 19 B) 0 C) -20 D) -40

6. If f(x) =$x^2\sqrt{2x+12}$, what is the equation of the tangent line to the graph of f at x = 2?

   A) y – 4 = 16 (x – 2) B) y = 17 (x -2) + 16 C) y = $\frac{1}{\sqrt{2}}$(x – 2) – 16 D) y = 8 (x – 2) + 32

7. If f(x) =π^2, then $f'(1)$ is equal to A) 0 B) 2π C) π^2 D) 1

8. Let f(x) = x $\left|\ x\ \right|$, for all x ∈ R. which of the following is true?

   A) f (x) is not differentiable at x = 0 C) f (x) is differentiable only on (0, ∞)

   B) f (x) is differentiable and $f'(x)$ =2 $\left|\ x\ \right|$ at each x ∈ R D) $f'(x)$ =2x at each x ∈ R

9. Let f(x) = $\begin{cases}3x-1, x \le 2\\ x+3\,x, x>2\end{cases}$ which of the following is true?

   A) $f'(2)=1$ B) $f'(2)=3$ C) $f'(2)=5$ D) f has no derivative at 2

10. If f(x) = x^5+2, then $\frac{f(1+h)-f(1)}{h}$ as h gets closer and closer to zero is equal to

    A) 2 B) 5 C) $\frac{5}{2}$ D) ∞

11. Suppose that at time t ≥ 0 the position of a particle moving along the x – axis is x = (t -1) $(t-4)^4$. During what time interval does the particle move to the left?

    A) [0, 3] B) [4, ∞) C) (0, $\frac{8}{3}$) D) ($\frac{8}{5}$, 4)

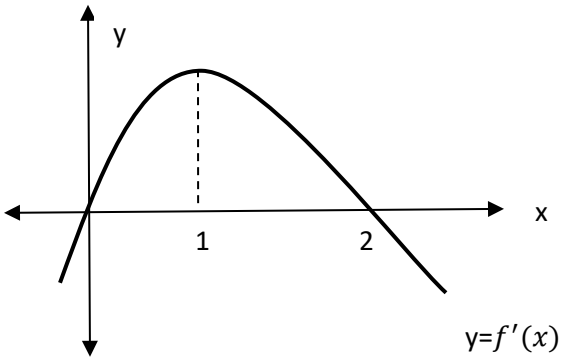
12. Let f (x) = x^4 - $\frac{16}{3}x^3$ + $6x^2$ for all x ∈ R. What is the range of f (x)?

    A) (-∞, ∞) B) [0, ∞) C) [-9,∞) D) (-∞, -9)

13. Let f(x) = x^3 – 12x + 1 be defined on [0, 3]. What is the range of f?

    A) (-∞, ∞) B) (-∞, 1] C) [-15, 1] D) [-15, 17]

14. Suppose f (x) is differentiable at all x ∈ R and the graph of y = f '(x) is as show in the figure below. Which of the following is true?



A) f (x) increases on (-∞, 1) C) f(x) attains its maximum value at x = 1

B) f (x) attains its maximum value at x = 2 D) f(x) decreases on (0, 2)

15. At what values of x does f(x)= $\frac{1}{3}x^3 - \frac{1}{2}x^2 - 2x + 1$ have a relative maximum value?

A) x = 1 B) x = 2, x = -1 C) x = 5 D) x = -1

16. Which of the following is a local minimum point of the graph of f (x)= $-3x^4+4x^3+12x^2+1$?

A) (-2, -33) B) (-1, 4) C)(0, 1) D)(2, 33)

17. Let $f(x) = x^4 - 6x^2 + 1$ on [-2, 3]. Which of the following is absolute maximum value of f?

A) f(0) B) f ($\sqrt{3}$) C) f(3) D) f($-\sqrt{3}$)

18. Which of the following is the set of all critical numbers of f(x) = $\begin{cases} x-1, x<1 \\ x^2 - x, x \geq 1 \end{cases}$?

A) {1} B) $\{\frac{1}{2}\}$ C) $\{\frac{1}{2}, 1\}$ D) {}

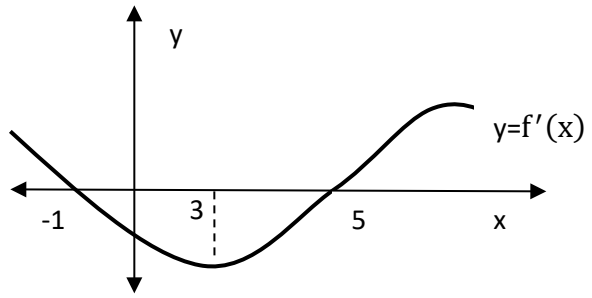
19. Which of the following is the set of all critical numbers of f(x) = $\frac{|x|}{x^2+1}$?

A) {-1, 0, 1} B) {0} C) {-1, 1} D) {}

20. Suppose f (x) is differentiable at all x ∈ R and the graph of y = f′(x) is as shown in the figure below. Which of the following is true?

A) f(x) increases on [3, ∞) C) f(x) decreases on [-1, 5]

B) f(x) attain minimum value at x = 3 D) f(x) attains as maximum value at x = 5



21. Which of the following is the largest interval on which f(x) = $\frac{x}{x^2+1}$ is increasing?

A) [0, ∞) B) (-∞, 1] C) (-∞, -1) U (1, ∞) D) [-1, 1]

22. What is the value of k so that $\frac{x}{x^2+k}$ will have a relative extreme at x = 2?

A) 0 B) 2 C) 4 D) 27

23.On which of the following interval is $f(x) = x^4 - 2x^2 + 10$ strictly decreasing?

A) (-∞, 0) B) (-1, 0) C) (0, 1) D) (1, ∞)

24. Let f(x) = $\frac{ax}{x+a}$. For what value of a is f'(1) = 1?

A. $\frac{1}{3}$ B. $\frac{2}{3}$ C. $\frac{3}{2}$ D. 3

25. Which one of the following is the equation of the line tangent to the graph of f(x) = $\frac{1}{x+1} + \cos x$ at (0,f(0))?

A. x+y = 1 B. x-y = -2 C. x+y=2 D. x+4y = 2

26.If $f(x) = \frac{x^2}{1+xg(x)}, g(2) = 1$ and g'(x)=10, then which one of the following is equal to f'(2)?

A.-8 B. $\frac{-8}{9}$ C. $\frac{4}{3}$ D. $\frac{8}{9}$

27. Let f be a differentiable function with f (1) =-1 and f'(1)=1. If $g(x) = [f(2x+1)+2)]^2$, then what is the value of g'(0)?

A. 4 B. 2 C. -2 D. -4

28. What is the equation of the tangent line to the graph of $f(x)=3x^2+4x-5$ at (1,2)?

A. 10x-y-8=0 B. -10x-y-8=0 C. -10x+y-8=0 D. 10x+y-8=0