

Unit 3-Derivatives

1. If $f(x) = 2x^3 - 5x^2 + 9x - 4$, find $f'(x)$.

A) $5x^2 - 7x + 9$

C) $6x - 5$

E) $6x^2 - 10x + 5$

B) $6x^2 - 10x + 9$

D) $12x - 10$

2. If $y = \frac{3}{x^2} - \frac{1}{x^3}$, then $\frac{dy}{dx} =$

A) $6x^3 + 3x^4$

C) $6x^3 - 3x^4$

E) $\frac{1}{-6x^3} + \frac{1}{3x^4}$

B) $\frac{6}{x^3} - \frac{3}{x^4}$

D) $\frac{-6}{x^3} + \frac{3}{x^4}$

3. Find $f'(x)$ if $f(x) = 4x^2(2x^2 - x + 6)$.

A) $32x^3 - 12x^2 + 48x$

C) $96x^2 - 24x + 48$

E) $32x^3 + 12x^2 + 48x$

B) $8x(4x - 1)$

D) $12x^3 - 7x^2 + 26x$

4. Find $f'(x)$ if $f(x) = \frac{x^3}{3x^2 + 1}$.

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

C) $\frac{x}{2}$

E) $\frac{3x^2(5x^2 + 1)}{(3x^2 + 1)^2}$

B) $-\frac{3x^4 + 3x^2}{3x^2 + 1}$

D) $15x^4 + 3x^2$

5. If $f(x) = \frac{5x^2 - 3}{4x + 9}$, find $f'(x)$.

A) $\frac{-2(10x^2 + 45x + 6)}{(4x + 9)^2}$

C) $2(10x^2 + 45x + 6)$

E) $-\frac{20x^2 + 90x + 12}{4x + 9}$

B) $\frac{20x^2 + 90x + 12}{4x + 9}$

D) $\frac{20x^2 + 90x + 12}{(4x + 9)^2}$

6. Find $f^4(x)$ (4th derivative notation) if $f(x) = 2x^6 - 3x^4 + 2x^3 + 7x - 4$.
- A) $720x^2 - 72$ C) $60x^4 - 36x^2 + 12x$ E) $1440x$
 B) $240x^3 - 72x + 12$ D) 0
7. Find the slope of the tangent line to the graph of $y = -\frac{1}{3}x^3 + \frac{3}{2}x^2 - 4x + 6$ at the point $(0, 6)$.
- A) $-\frac{1}{4}$ C) $-\frac{4}{5}$ E) -4
 B) 0 D) 4
8. If the position function of a particle is given by $s(t) = 6t^2 + 2t + 5$, what is the average velocity in the time interval $[1, 6]$?
- A) 13u/s C) 44u/s E) 233u/s
 B) 28 u/s D) 220u/s
9. If the position function of an object is given by $s(t) = 4t^3 - 3t + 2$, what is the velocity at $t = 2$?
- A) 2u/s C) 36 u/s E) 45 u/s
 B) 21 u/s D) 41 u/s
10. A particle has a position function of $s(t) = 2t^3 + 6t^2 - 7t + 4$. At what time will the velocity equal 11?
- A) -3 C) 0 E) 3
 B) -1 D) 1
11. A particle has a position function of $s(t) = t^3 + 3t^2 - 2t + 7$. What is the acceleration at $t = 5$?
- A) 197 C) 36 E) 22
 B) 83 D) 30
12. Find y' if $y = \sqrt{x} - \frac{4}{x^3}$.
- A) $\frac{1}{2\sqrt{x}} + \frac{12}{x^4}$ C) $\frac{1}{2\sqrt{x}} - \frac{12}{x^4}$ E) $\frac{1}{2\sqrt{x}} + \frac{12}{x^2}$
 B) $\frac{1}{2}x^{1/2} - \frac{12}{x^4}$ D) $\frac{1}{2\sqrt{x}} + \frac{12}{x^2}$