1) Which choice is a graph of the line with equation, \(2x - 3y = 12\)?

A. \[y = \frac{2}{3}x - 4\]
B. \[y = \frac{2}{3}x + 4\]
C. \[y = -\frac{2}{3}x - 4\]
D. \[y = -\frac{2}{3}x + 4\]
E. \[y = \frac{2}{3}x\]

2) Find this limit, if possible.
\[
\lim_{x \to 16} \frac{\sqrt{x} - 4}{x - 16}
\]

A. \(\infty\)
B. \(\frac{1}{8}\)
C. 0
D. 8
E. The limit does not exist.

3) Find this limit:
\[
\lim_{x \to 2} \left( \frac{3x^2 - 8x + 4}{x^2 - 4} \right)
\]

A. 0
B. \(\infty\)
C. 3
D. 1
E. -1
4) Find this limit, if possible. \[ \lim_{{x \to \infty}} \frac{2x^2 - 7x^4}{9x^4 + 5x^2 - 6} \]

A. \( \frac{7}{9} \)
B. \( -\frac{7}{9} \)
C. \( \frac{2}{9} \)
D. \( \infty \)
E. Limit does not exist.

5) Find the average rate of change of the function \( f(x) = 3x^2 - 2x - 1 \) on the interval \([-2, 1]\).

A. \(-15\)
B. \(15\)
C. \(5\)
D. \(-5\)
E. \(-14\)

6) Find the equation in slope-intercept form of the line tangent to the graph of \( f(x) = 2x^2 - \sqrt{x} + 2 \) at the point \((1, 3)\)

A. \( y = \frac{11}{2}x - \frac{5}{2} \)
B. \( y = \frac{7}{2}x - \frac{1}{2} \)
C. \( y = \frac{11}{2}x - \frac{31}{2} \)
D. \( y = \frac{7}{2}x \)
E. \( y = \frac{7}{2}x + 3 \)

7) Find the derivative of this function. \( f(x) = 5x^2 + 12\sqrt{x} - \frac{3}{x^3} \)

A. \( f'(x) = 10x - \frac{4}{x^{5/3}} + \frac{12}{x^5} \)
B. \( f'(x) = 10x - \frac{4}{x^{5/3}} - \frac{3}{4x^3} \)
C. \( f'(x) = 10x + \frac{4}{x^{2/3}} + \frac{12}{x^5} \)
D. \( f'(x) = 10x + \frac{4}{x^{2/3}} - \frac{3}{4x^3} \)
E. \( f'(x) = 10x + \frac{4}{x^{2/3}} - \frac{12}{x^5} \)
8) The profit from the sale of \( x \) hamburgers is given by the profit function below.

\[
P(x) = 2.44x - \frac{1}{20000}x^2 - 5000 \quad \text{for} \quad 0 \leq x \leq 50000
\]

Approximate the profit (or loss) from the sale of the 20001\(^{st}\) hamburger by finding the marginal profit when \( x \) is 20000.

A. Profit: $1.44 / hamburger
B. Profit: $2.38/hamburger
C. Profit: $0.94/hamburger
D. Profit: $0.44/hamburger
E. Loss: −$0.94/hamburger

9) Find a point on the graph of \( f(x) = x^3 + 3x^2 \) where the tangent line to the point is horizontal. (Think: What is the slope of a horizontal line?)

A. (1, 4)
B. (−2, 4)
C. (0,1)
D. (2, 20)
E. (−2,0)

10) At time 0, a diver jumps from a diving board that is 32 feet high. Because the diver’s initial velocity is 16 feet per second, his height above the water is given by the function, \( h(t) = -16t^2 + 16t + 32 \). In 2 seconds, the diver hits the water. What is his velocity at the time he hits the water?

A. −32 ft./sec.
B. −36 ft./sec.
C. −42 ft./sec.
D. −48 ft./sec.
E. −54 ft./sec.
11) Find the derivative of the function, \( y = f(x) = (2x^3 - x + 1)(3x - 5) \).

A. \( y' = 24x^3 - 30x^2 - 6x + 8 \)
B. \( y' = 24x^3 - 30x^2 - 3x + 3 \)
C. \( y' = -12x^3 - 30x^2 - 6x + 8 \)
D. \( y' = 6x^3 - 12x^2 - 6x + 8 \)
E. \( y' = -12x^3 + 30x^2 - 2 \)

12) If \( g(x) = \frac{1 - 4x}{2x + 3} \), find the value of the derivative at the point \( (1, \frac{3}{2}) \).

A. \( \frac{-26}{25} \)
B. \( \frac{14}{25} \)
C. \( \frac{26}{25} \)
D. \( \frac{-14}{25} \)
E. \( \frac{-18}{25} \)

13) Find the slope of the tangent line to \( f(x) = (x^3 - 4)(x^2 - x + 2) \) at the point \( (2, 16) \).

A. \( m = -60 \)
B. \( m = 60 \)
C. \( m = 36 \)
D. \( m = -36 \)
E. \( m = 48 \)
14) Find the value of the derivative of \( y = 2x^2 \left( 2x + \sqrt{x} - \frac{3}{x} \right) \) at the point (1,0).

A. 22  
B. 0  
C. 11  
D. -2  
E. -6

15) A company that manufactures bicycles has determined that a new employee can assemble \( N(d) \) bicycles per day after \( d \) days of on-the-job training, where \( N(d) = \frac{100d^2}{3d^2 + 10} \). Find and interpret \( N'(5) \).

A. The new employee is assembling 11.7 additional bicycles per day after 5 days of training.  
B. The new employee is assembling 2.8 additional bicycles per day after 5 days of training.  
C. The new employee is assembling 23.5 additional bicycles per day after 5 days of training.  
D. The new employee is assembling 10.7 additional bicycles per day after 5 days of training.  
E. The new employee is assembling 1.4 additional bicycles per day after 5 days of training.