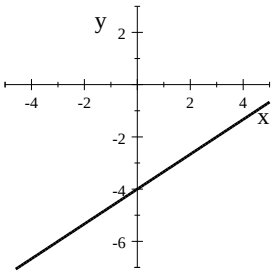
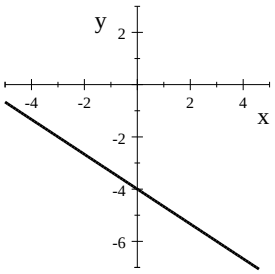
1) Which choice is a graph of the line with equation, $2x - 3y = 12$?

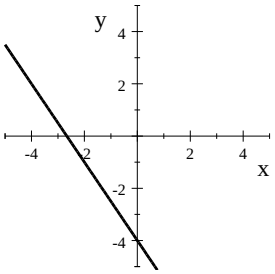
A.



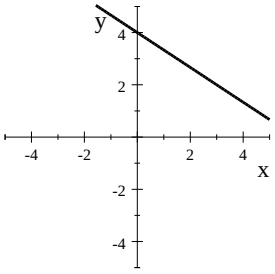
B.



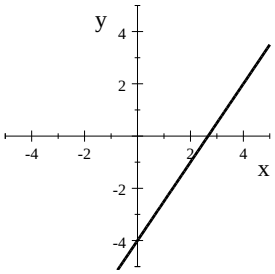
C.



D.



E.



2) Find this limit, if possible.

$$\lim_{x\to 16} \frac{\sqrt{x}-4}{x-16}$$

A. ∞

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. ∞

C. 3

D. 1

E. -1

4) Find this limit, if possible. $\lim_{x\to\infty}\left(\frac{2x^2-7x^4}{9x^4+5x^2-6}\right)$

A. $\frac{7}{9}$

B. $-\frac{7}{9}$

C. $\frac{2}{9}$

D. ∞

E. Limit does not exist.

5) Find the <u>average rate of change</u> 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. $f(x)=5x^2+12\sqrt[3]{x}-\frac{3}{x^4}$

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.

$$P(x) = 2.44x - \frac{1}{20000}x^2 - 5000 \text{ for } 0 \le x \le 50000$$

Approximate the profit (or loss) from the sale of the 20001st 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 $(1, -\frac{3}{5})$.

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.