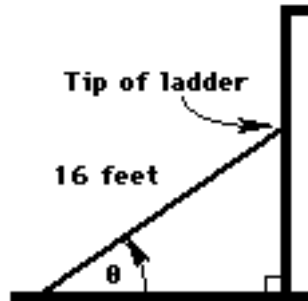


CALCULUS I – Worksheet #59

1. (Free Response) A particle moves along the x-axis so that its acceleration at any time $t > 0$ is given by $a(t) = 12t - 18$. At time $t = 1$, the velocity of the particle is $v(1) = 0$ and the position is $x(1) = 9$.
- (a) Write an expression for the velocity of the particle $v(t)$.
- (b) At what values of t does the particle change direction?
- (c) Write an expression for the position $x(t)$ of the particle.
- (d) Find the total distance traveled by the particle from $t = \frac{3}{2}$ to $t = 6$.



2. The figure above shows a 16-foot ladder leaning against a vertical wall. The tip of the ladder is sliding down the wall at the rate of 5.6 feet per second. What is the rate of change, in radians per second, of the angle θ at the instant when the tip of the ladder is 7 feet above the ground?
- A) -6.223 B) -0.800 C) -0.389 D) -0.321 E) -0.070

3. If $F(x) = \int_0^x \sqrt{\tan t} \, dt$, then $F'(0.5) =$ A) 0.089 B) 0.093 C) 0.546 D) 0.739 E) 1.139

4. The rate of decay of a radioactive substance is proportional to the amount of substance present at any time t . In 1840 there were 50 grams of the substance and in 1910 there were 35 grams. To the nearest gram, how many grams of the substance remain in 1990? A) 18 B) 20 C) 23 D) 36 E) 107

5. The slope of the tangent to the curve $y^3x + y^2x^2 = 6$ at $(2,1)$ is:
- A) $-\frac{3}{2}$ B) -1 C) $-\frac{5}{14}$ D) $-\frac{3}{14}$ E) 0

6. If $f(x) = \sin^2(3 - x)$, then $f'(0) =$
- A) $-2 \cos 3$ B) $-2 \sin 3 \cos 3$ C) $6 \cos 3$ D) $2 \sin 3 \cos 3$ E) $6 \sin 3 \cos 3$

7. $\int (x-1)\sqrt{x} \, dx =$ A) $\frac{3}{2}\sqrt{x} - \frac{1}{\sqrt{x}} + C$ B) $\frac{2}{3}x^{\frac{3}{2}} + \frac{1}{2}x^{\frac{1}{2}} + C$ C) $\frac{1}{2}x^2 - x + C$
- D) $\frac{2}{5}x^{\frac{5}{2}} - \frac{2}{3}x^{\frac{3}{2}} + C$ E) $\frac{1}{2}x^2 + 2x^{\frac{3}{2}} - x + C$

8. The area of the region in the first quadrant between the graph of $y = x\sqrt{4-x^2}$ and the x-axis is
A) $\frac{2}{3}\sqrt{2}$ B) $\frac{8}{3}$ C) $2\sqrt{2}$ D) $2\sqrt{3}$ E) $\frac{16}{3}$

9. The value for c for which $f(x) = x + \frac{c}{x}$ has a local minimum at $x = 3$ is
A) -9 B) -6 C) -3 D) 6 E) 9

10. Let $G(x) = [f(x)]^2$. At $x = a$, f is increasing and concave downward, while G is decreasing.
Which describes G at $x = a$?
A) concave downward B) concave upward C) linear D) point of inflection E) none of these
