

1.(1 pt) A particle moves along a straight line and its position at time t is given by $s(t) = 2t^3 - 21t^2 + 36t$ where s is measured in feet and t in seconds.

Find the velocity (in ft/sec) of the particle at time $t = 0$: _____

The particle stops moving (i.e. is in a rest) twice, once when $t = A$ and again when $t = B$ where $A < B$. A is _____ and B is _____

What is the position of the particle at time 14? _____

Finally, what is the TOTAL distance the particle travels between time 0 and time 14? _____

2.(1 pt) If a ball is thrown vertically upward from the roof of 64 foot building with a velocity of 112 ft/sec, its height after t seconds is $s(t) = 64 + 112t - 16t^2$. What is the maximum height the ball reaches? _____

What is the velocity of the ball when it hits the ground (height 0)? _____

3.(1 pt) The area of a square with side s is $A(s) = s^2$. What is the rate of change of the area of a square with respect to its side length when $s = 14$? _____

4.(1 pt) The population of a slowly growing bacterial colony after t hours is given by $p(t) = 5t^2 + 30t + 150$. Find the growth rate after 4 hours. _____

5.(1 pt) The cost of producing x units of stuffed alligator toys is $c(x) = 0.004x^2 + 10x + 7000$. Find the marginal cost at the production level of 1000 units. _____

6.(1 pt) A mass attached to a vertical spring has position function given by $s(t) = 3 \sin(3t)$ where t is measured in seconds and s in inches.

Find the velocity at time $t = 1$. _____

Find the acceleration at time $t = 1$. _____

7.(1 pt) The mass of the part of a rod that lies between its left end and a point x meters to the right is $1x^4$ kg. The linear density of the rod at 3 meters is _____ kg/meter and at 3 meters the density is _____ kg/meter

8.(1 pt) If f is the focal length of a convex lens and an object is placed at a distance p from the lens, then its image will be at a distance q from the lens, where f , p , and q are related by the lens equation

$$\frac{1}{f} = \frac{1}{p} + \frac{1}{q}$$

What is the rate of change of p with respect to q if $q = 2$ and $f = 6$? (Make sure you have the correct sign for the rate.)

9.(1 pt) A particle moves along a straight line with equation of motion $s = t^6 - 5t^5$ Find the value of t (other than 0) at which the acceleration is equal to zero.