Name: _____ Date:_____

Corrective Assignment

Unit 4 CA – Contextual Application of Differentiation

1. The position of a particle moving along a coordinate line is $s(t) = 2t^3 - 6t$, with s in meters and t in seconds. Find the particle's velocity and acceleration at $t = 6$.

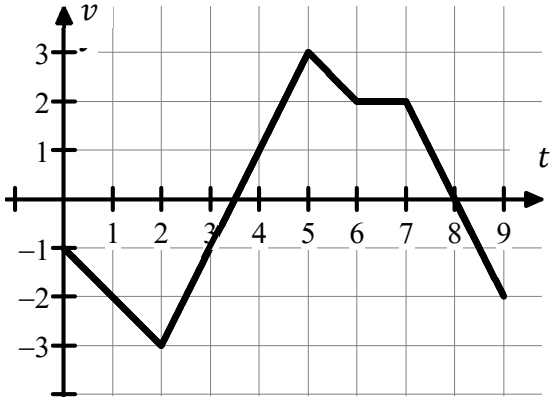
Find the following. Use L'Hospital's when possible.		
2. $\lim_{x\to 0} \frac{x^2}{1-\cos(3x)}$	3. $\lim_{x\to 4} \frac{x^2+6x-40}{4-x}$	4. $\lim_{x\to 3} \frac{x^2-2x+1}{x-3}$

5. The figure shows the velocity v of a body moving along a coordinate line in meters per second.

a) When does the body reverse direction?

b) When is the body moving at a constant speed?

c) What is the body's maximum speed?



d) At what time interval(s) is the body slowing down?

6. A rocket lifts off at the Kennedy Space Center in Florida. A camera is placed 2000 feet away from the launch pad to film the rocket's ascent. The height of the rocket can be found using $s(t) = 50t^2$, where s is feet and t is seconds. Find the rate of change in the angle of elevation of the camera at 10 seconds after lift-off.

7. Two roads cross at right angles, one running north/south and the other east/west. Eighty feet south of the intersection is an old radio tower. A car traveling at 50 feet per second passes through the intersection heading east. At how many feet per second is the car moving away from the radio tower 3 seconds after it passes through the intersection?

(A) 43.65 (B) 44.12 (C) 44.59

(D) 56.67 (E) 81.76

8. The function $f(x) = -xe^x + 2$ is concave down at $x = 0$.
   a. Find the tangent line of f at $x = 0$.

   b. What is the estimate for $f(-0.1)$ using the local linear approximation for f at $x = 0$?

   c. Is it an underestimate or overestimate? Explain.

Unit 4 Corrective Assignment – Answers

1. $s'(6) = 210$ meters / sec $s''(6) = 72$ meters / sec^2	2. $\frac{2}{9}$	3. -14	4. Does not exist	5a. $t = 3.5$ and $t = 8$ 5b. $(6, 7)$ 5c. 3 meters / sec 5d. $(2, 3.5)$, $(5, 6)$ and $(7, 8)$
6. Setup: $\tan\theta = \frac{1}{2000}s$ Answer: 0.0689 radians per second		7. B	8a. $y = -x + 2$ 8b. $f(-0.1) \approx 2.1$ 8c. Overestimate because $f(x)$ is concave down.	