BC CALCULUS PRACTICE 5.8 **Name:** ____________________________ **Period** _______

Aisle _________

pg. 342 – 9, 11bc, 13-19 odd, 29, 32, 35

Show all work for full credit.

9.

Sketch a reasonable graph of s versus t for a mouse that is trapped in a narrow corridor (an s-axis with the positive direction to the right) and scurries back and forth as follows. It runs right with a constant speed of 1.2 m/s for awhile, then gradually slows down to 0.6 m/s, then quickly speeds up to 2.0 m/s, then gradually slows to a stop but immediately reverses direction and quickly speeds up to 1.2 m/s.

11.

Let $s(t) = \sin(\pi t/4)$ be the position function of a particle moving along a coordinate line, where s is in meters and t is in seconds.

(b) At each of the times in part (a), determine whether the particle is stopped; if it is not, state its direction of motion.

(c) At each of the times in part (a), determine whether the particle is speeding up, slowing down, or neither.

13-17. The function $s(t)$ describes the position of a particle moving along a coordinate line, where s is in feet and t in in seconds.

(a) Find the velocity and acceleration functions.

(b) Find the position, velocity, speed, and acceleration at time $t = 1$.

(c) At what times is the particle stopped?

(d) When is the particle speeding up? Slowing down?

(e) Find the total distance traveled by the particle from time $t = 0$ to time $t = 5$.

13. $s(t) = t^3 - 3t^2, t \geq 0$

15. $s(t) = 9 - 9\cos\left(\frac{\pi t}{3}\right), 0 \leq t \leq 5$	17. $s(t) = (t^2 + 8)e^{-t/3}, t \geq 0$

19.

Let $s(t) = t/(t^2 + 5)$ be the position function of a particle moving along a coordinate line, where s is in meters and t is in seconds. Use a graphing utility to generate the graphs of $s(t)$, $v(t)$, and $a(t)$ for $t \geq 0$, and use those graphs where needed.

(a) Use the appropriate graph to make a rough estimate of the time at which the particle first reverses the direction of its motion; and then find the time exactly.

(b) Find the exact position of the particle when it first reverses the direction of its motion.

(c) Use the appropriate graphs to make a rough estimate of the time intervals on which the particle is speeding up and on which it is slowing down; and then find those time intervals exactly.

29.

Let $s(t) = 5t^2 - 22t$ be the position function of a particle moving along a coordinate line, where s is in feet and t is in seconds.

(a) Find the maximum speed of the particle during the time interval $1 \le t \le 3$.

(b) When, during the time interval $1 \le t \le 3$, is the particle farthest from the origin? What is its position at that instant?

32. A position function of a particle moving along a coordinate line is provided.

(a) Evaluate s and v when $a = 0$.

(b) Evaluate s and a when $v = 0$.

$$s = t^3 - 6t^2 + 1$$

35.

Suppose that the position functions of two particles, P_1 and P_2, in motion along the same line are

$$s_1 = \frac{1}{2}t^2 - t + 3 \quad \text{and} \quad s_2 = -\frac{1}{4}t^2 + t + 1$$

respectively, for $t \ge 0$.

(a) Prove that P_1 and P_2 do not collide.

(b) How close can P_1 and P_2 get to one another?

(c) During what intervals of time are they moving in opposite directions?