CALCULUS WORKSHEET – MOTION PROBLEMS 2

1.) <u>**SOLVE ALGEBRAICALLY:**</u> $s(t) = \frac{1}{3}t^3 - 4t^2 + 12t$ A particle moves horizontally

on a number line with its position given by the above equation.

a.) When does the object change direction?
b.) When is the object traveling left?
c.) What is the displacement of the object from t = 0 to t = 3?
d.) What is the total distance traveled from t = 0 to t = 3?
e.) What is the velocity of the object when its acceleration is 0?
f.) What is the acceleration of the object when its velocity is 0?
g.) When is the velocity of the object increasing?
h.) When is the speed of the object increasing?

2.) <u>**SOLVE GRAPHICALLY:**</u> $s(t) = -2t^3 + 9t^2 - 6t - 5$ A particle moves horizontally
on a number line with its position given by the above equation.

a.) When does the object move left?
b.) When is the object at rest?
c.) When is the velocity of the object increasing?
d.) When is the speed of the object increasing?
e.) When is the object at a position of 5?

3.) Write a model (equation or inequality) for each statement below if y represents the
number of bacteria in a certain culture.

a.) The number of bacteria is currently 2.5 million.
b.) The number of bacteria is growing.
c.) The growth rate of the bacteria is decreasing.

4.) Given the graph of the **growth rate** of a rabbit population, write a detailed description of
the population. In particular, discuss whether the population is growing or declining, whether
the rate of growth or decline is increasing or decreasing, and when the population reaches its
maximum and minimum.
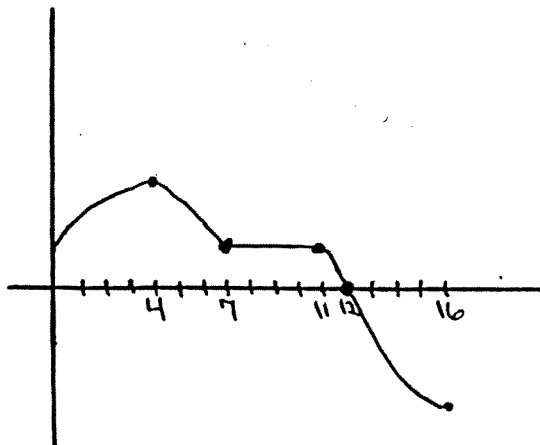
5.) A particle moves on the x-axis so that at time t its position is given by $x(t) = t^3 - 6t^2 + 9t + 11$.

a.) What is the velocity of the particle at t = 0?
b.) During what time intervals is the particle moving to the left?
c.) What is the total distance traveled by the particle from t = 0 to t = 2.?

6.) The graph of the position function for an object is given below.
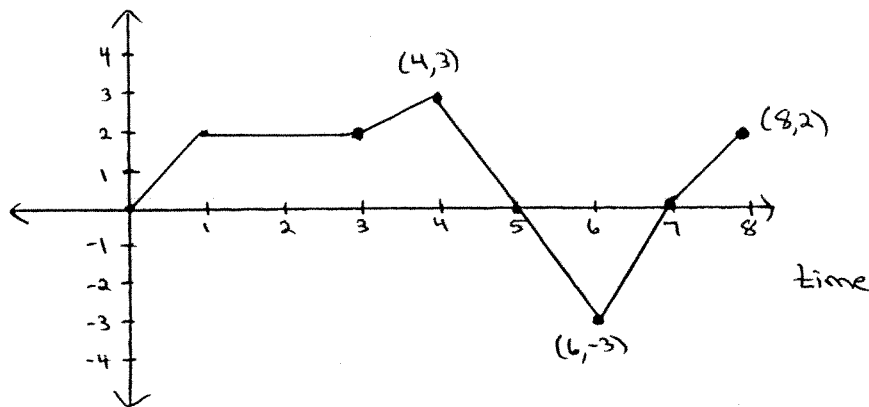
a.) When is the object traveling left?
b.) When is the object stationary?
c.) Graph the velocity of the object.
d.) Graph the speed of the object.
e.) Over what time interval(s) is the velocity of the object 0?

7.) Assume the graph given in #6 is the graph of the velocity function, rather than the position function.

a.) When is the object traveling left?
b.) When is the object stationary?
c.) Graph the speed of the object.
d.) When is the acceleration of the object positive?
e.) Graph the acceleration of the object.