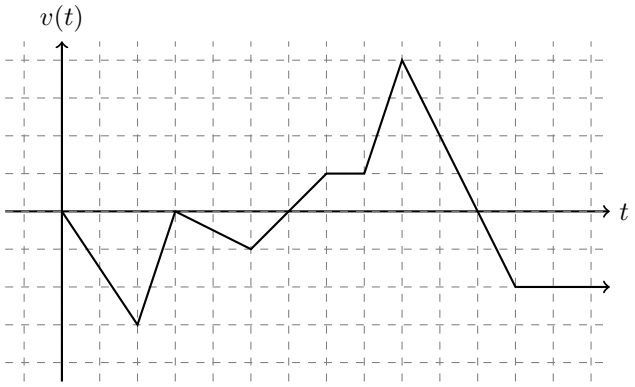
Rutgers University
Math 151

Section 3.4: Rates of Change - Worksheet

1. The position of a body moving an axis is given by $s(t) = \dfrac{t^4}{4} - 2t^3 + 8$.
   (a) Find the body's displacement and average velocity on the time interval $[0, 2]$.
   (b) Find the velocity and acceleration of the body.
   (c) When does the body change direction?

2. A projectile is thrown at $t = 0$ straight up in the air from an altitude of 99 m at a speed of 24 m/sec. The projectile being subject to gravity only, physicists tell us that the elevation of the projectile is subject to a law of the form $h(t) = at^2 + bt + c$, where a, b, c are unspecified constants.
   (a) Find b and c using the information given.
   (b) Suppose that the projectile reaches its maximum elevation 4 seconds after being thrown. Find the value of the constant a.
   (c) When will the projectile hit the ground?

3. The graph below shows the velocity v of an object moving along an axis.



   (a) When is the object moving forward? backward?
   (b) When does the object reverse direction?
   (c) Sketch the graph of the acceleration of the object.