

MATH 111 – EXAM I Hints and Answers  
Version Alpha  
Winter 2006

1. (a) (4 points) HINT: Compute the slope of the diagonal line through the distance graph at  $t = 25$ .  
ANSWER: around 3
  - (b) (4 points) HINT: Compute the slope of the secant line through the distance graph at  $t = 10$  and  $t = 35$ .  
ANSWER: around 2.2
  - (c) (3 points) ANSWER:  $\frac{D(t+10) - D(t)}{10}$
  - (d) (3 points) ANSWER: The object travels 13 feet in the  $h$  seconds beginning at  $t = 25$ .
  - (e) (4 points) HINT: If the object travels 10 feet in 10 seconds, then the object's average speed during that time is  $\frac{10 \text{ feet}}{10 \text{ seconds}} = 1$  foot per second. So, draw a reference line with slope 1 and use the "rolling ruler" method to find a secant line through your distance graph that is parallel to your reference line and that intersects the distance graph at two times that are 10 seconds apart.  
ANSWER: from about 32 to 42
2. (4 points each)
    - (a) ANSWER:  $p = \frac{45 \text{ hundred dollars}}{15 \text{ hundred Items}} = 3$  dollars per Item.  $TR$  is a diagonal line with slope 3.
    - (b) HINT: Find the quantity at which the slope of the tangent line to  $TC$  is parallel to  $TR$ .  
ANSWER: about 17.8
    - (c) HINT: Compute the slope of the diagonal line through  $TC$  at  $q = 6$ .  
ANSWER: about 4.3
    - (d) HINT: Compute the slope of the least steep diagonal line that intersects the  $VC$  graph.  
ANSWER: about 2.3
    - (e) HINT: Draw a diagonal line with slope 3 and find the quantity at which it intersects the  $VC$  graph.  
ANSWER: about 9
3. (a) (2 points) ANSWER: There are several correct answers. The interval from 9 to 11 is one acceptable answer.
  - (b) (2 points) ANSWER:  $x =$  about 1.2 or about 4.8
  - (c) (2 points) HINT:  $\frac{f(x)}{x}$  is the slope of the diagonal line through  $f(x)$  at  $x$ .  $\frac{g(x)}{x}$  is the slope of the diagonal line through  $g(x)$  at  $x$ . These will be equal at the value of  $x$  where the graphs of  $f(x)$  and  $g(x)$  intersect.  
ANSWER: about 9.9
  - (d) (3 points) HINT: Look for an  $x$  such that the secant line through  $f(x)$  from 2 to  $x$  is horizontal.  
ANSWER: about 12
  - (e) (3 points) ANSWER:  $x = 2, 10,$  and 13