

MATH 111 – EXAM I Hints and Answers  
Version Alpha  
Autumn 2008

1. (a) (4 points) HINT: Price per item is the same as average revenue. Average revenue at  $q = 3$  hundred Items is the slope of the diagonal line through the  $TR$  graph at 3.  
ANSWER: approximately \$86.67 per Item
  - (b) (4 points) HINT: You're looking for the marginal revenue at  $q = 4$  hundred Items. Draw the secant line through the  $TR$  graph at  $q = 4.00$  and  $q = 4.01$  and compute its slope.  
ANSWER: approximately \$53.33
  - (c) (2 points) NOTE: There was a typo on this exam. The fixed costs should have been 140 hundred dollars.  
ANSWER: The  $TC$  graph is a line parallel to the  $VC$  graph with "y"-intercept 140.
  - (d) (4 points) ANSWER: Since  $TC$  is linear, every time you produce one more Item, your total cost will increase by the same amount (that amount being the slope of the  $TC$  graph: approximately 23.70). So, the graph of marginal cost will be a horizontal line with height 23.70.
  - (e) (4 points) HINT: Profit (the vertical distance between  $TR$  and  $TC$ ) is largest at about  $q = 6$  hundred Items.  
ANSWER: Maximum profit is approximately 120 hundred dollars or \$12000.
2. (4 points each)
    - (a) HINT: The smallest value of  $MC$  is the "y"-coordinate of the lowest point on the  $MC$  graph.  
ANSWER: \$2 per Thing
    - (b) HINT: The breakeven price is the "y"-coordinate of the point of intersection of  $MC$  and  $AC$ .  
ANSWER: approximately \$6.55 per Thing
    - (c) HINT: Average cost at 7 Things is approximately \$8.30 per Thing and  $AC(7) = \frac{TC(7)}{7}$ .  
ANSWER: approximately \$58.10
    - (d) HINT: Draw the graph of  $MR$ : a horizontal line with height 5.50. Profit is maximized at the smallest **whole number** quantity at which  $MR$  becomes **less than or equal to**  $MC$ .  
ANSWER: 11 Things
3. (a) (6 points – 3 points each)
    - i. ANSWER:  $A(5) - A(0)$
    - ii. ANSWER:  $\frac{B(t+h) - B(t)}{h}$
  - (b) (4 points) HINT: Draw a reference line with slope 2. Slide your reference line up until it intersects the graph of  $B$  at its "y"-intercept and find another point at which it intersects the  $B$  graph.  
ANSWER: approximately  $t = 0.7$  or  $t = 5.2$
  - (c) (4 points) HINT: Find a time at which the vertical gap between the two graphs is 3 and the  $B$  graph is above the  $A$  graph.  
ANSWER: approximately  $t = 8.25$
  - (d) (2 points) ANSWER: iii