

MATH 111 – EXAM II Hints and Answers  
Autumn 2008

1. (a) (5 points) HINT:  $TR(q + 1) = -0.14(q + 1)^2 + 14(q + 1) = -0.14q^2 + 13.72q + 13.86$   
ANSWER:  $MR(q) = -0.28q + 13.86$
  - (b) (4 points) HINT: Set  $TR - TC = 60$  and simplify.  
ANSWER:  $0.01q^3 - 0.61q^2 + 5.75q + 85 = 0$
  - (c) (5 points) HINT:  $AVC(q) = 0.01q^2 - 0.75q + 19.75$  The shutdown price is the “y”-coordinate of the vertex of  $AVC$ .  
ANSWER: \$5.69 per Trimble
2. (4 points each)
    - (a) ANSWER:  $A(x) = -2x^2 + 11x$ ,  $B(x) = 5 + 3x$
    - (b) HINT:  $C(x) = -2x^2 + 8x - 5$  Find the “y”-coordinate of its vertex.  
ANSWER: 3
    - (c) HINT:  $C(x)$  decreases from  $x = 2$  on.  $A(x)$  increases until  $x = 2.75$ .  
ANSWER: from  $x = 2$  to  $x = 2.75$
    - (d) HINT:  $B(x)$  is a linear function with positive slope. It is smallest at  $x = 1$ .  
ANSWER: 8
    - (e) HINT:  $A(x)$  is a quadratic function whose graph is a parabola that opens down. Set  $A(x) = 12$  and solve for  $x$ . If there are any solutions to this equation,  $A(x)$  will be at least 12 in between those solutions.  
ANSWER: from  $x = 1.5$  to  $x = 4$
3. (4 points each)
    - (a) HINT:  $MC$  is a linear function whose graph goes through the points (100, 30.4) and (200, 60.4).  
ANSWER:  $MC(q) = 0.3q + 0.4$ ,  $VC(q) = 0.15q^2 + 0.25q$
    - (b) HINT: Either set  $MR = MC$  and solve for  $q$  or find the formula for profit ( $P(q) = TR(q) - TC(q)$ ), which is a quadratic whose graph is a parabola that opens downward, and find the  $q$ -coordinate of its vertex.  
ANSWER:  $q = 150$  or  $q = 151$  Frinks (both answers will give the same profit)
    - (c) ANSWER: \$397.50
    - (d) HINT:  $AC(q) = \frac{0.15q^2 + 0.25q + 3000}{q} = 64.50$ . Multiply both sides of this equation by  $q$  to obtain a quadratic equation. Solve the equation using the quadratic formula.  
ANSWER:  $q = 375$  Frinks