

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

1. (a) (3 points) HINT: Compute  $TR(2.5) - TR(2)$ .  
ANSWER: \$31
- (b) (5 points) HINT: Find the formula for profit,  $P(q) = TR(q) - TC(q) = -6q^2 + 75q - 80$ . Set  $P(q) = 75$  and solve for  $q$ .  
ANSWER:  $q = 2.61$  Hundred Things
- (c) HINT: The graph of profit is a parabola that opens downward. It is increasing from  $q = 0$  to the  $q$ -coordinate of its vertex.  
ANSWER: from  $q = 0$  to  $q = 6.25$  Hundred Things
- (d) HINT: Compute the “ $y$ ”-coordinate of the vertex of the profit function.  
ANSWER: \$154.38
2. (a) (4 points) HINT: Object  $A$ 's speed graph goes through the two points  $(0, 24)$  and  $(5, 15)$ ; Object  $B$ 's speed graph goes through  $(0, 9)$  and  $(5, 15)$ . Find the equation of each line.  
ANSWERS:  $S_A(t) = -\frac{9}{5}t + 24$ ,  $S_B(t) = \frac{6}{5}t + 9$
- (b) (4 points) ANSWERS:  $D_A(t) = -\frac{9}{10}t^2 + 24t$ ,  $D_B(t) = \frac{6}{10}t^2 + 9t$
- (c) (3 points) HINT: The cars are farthest apart when they have the same speed. That happens at  $t = 5$ . So, the greatest distance between the cars is  $D_A(5) - D_B(5)$ .  
ANSWER: 37.5 feet
- (d) (4 points) HINT: Object  $A$ 's average trip speed is  $\frac{D_A(t)}{t} = -\frac{9}{10}t + 24$ . Set this equal to 19.77 and solve for  $t$ .  
ANSWER:  $t = 4.7$  seconds
3. (a) (4 points) HINT: Set  $V(t) = 20$  and solve for  $t$ .  
ANSWER: from  $t = 0.15$  to  $t = 16.35$  minutes
- (b) (3 points) HINT: Find the  $t$ -coordinate of the vertex of  $V(t)$ .  
ANSWER:  $t = 8.25$  minutes
- (c) (4 points) HINT:  $U(t) = V(t - 3) = -2(t - 3)^2 + 33(t - 3) + 15$ . Simplify.  
ANSWER:  $U(t) = -2t^2 + 45t - 102$
4. (a) (3 points) HINT: Since profit is maximized at  $q = 7$ ,  $MC(7) = MR(7)$ . So,  $-6(7) + b = 4(7) + 56$ . Solve for  $b$ .  
ANSWER:  $b = 126$
- (b) (3 points) HINT: The change in  $TR$  as  $q$  increases from 4 to 5 Items is simply  $MR(4)$ .  
ANSWER: 102 dollars
- (c) (4 points) HINT: The breakeven price is the “ $y$ ”-coordinate of the point of intersection of  $MC$  and  $AC$ . So, set  $MC = AC$  and solve for  $q$ . This gives  $q = 13$ . The breakeven price is then  $MC(13)$  or  $AC(13)$ .  
ANSWER: \$108