

**MATH 111**  
Exam II — Purple  
Hints and Answers

1. (a) HINT: Find the equation of the line through the points (10, 12) and (90, 8).  
ANSWER:  $p = -0.05q + 12.5$
- (b) HINT:  $TR(q) = pq$   
ANSWER:  $TR(q) = -0.05q^2 + 12.5q$
- (c) HINT: Find the  $q$ -coordinate of the vertex of the  $TR$  function.  
ANSWER:  $q = 125$
2. (a) HINT: Average trip speed is  $\frac{D(t)}{t} = 1.6t + 20$ . Set this equal to 24 and solve for  $t$ .  
ANSWER:  $t = 2.5$  hours
- (b) HINT: Set  $D(t)$  equal to 100 and solve for  $t$  using the quadratic formula.  
ANSWER:  $t = 3.83$  hours
- (c) HINT: You're looking for a formula for  $\frac{D(t+1) - D(t)}{1}$ .  
ANSWER: average speed =  $3.2t + 21.6$
- (d) HINT: Set your formula from part (c) equal to 23 and solve for  $t$ .  
ANSWER: from  $t = 0.4375$  to  $t = 1.4375$
3. (a) HINT: Use the vertex formula to find that  $MC$  hits its lowest value at  $q = 3.4$ . So, the lowest value of  $MC$  is  $MC(3.4)$ .  
ANSWER: \$0.022
- (b) HINT: Set  $MR = MC$  and solve for  $q$  using the quadratic formula. This gives two values of  $q$ : 0.23 and 8.57. You can see from the graph of  $MR$  and  $MC$  that profit is maximized at 8.57 (and not at 0.23) since that is where you have the transition from  $MR > MC$  (increasing profit) to  $MR < MC$  (decreasing profit).  
ANSWER:  $q = 8.57$
4. (a) HINT:  $FC = TC(0)$ . So, plug 0 in for  $q$  in the  $TC$  function.  
ANSWER:  $FC = \$81$
- (b) HINT: Compute  $TC(8245)$ :  $TC(8245) = 166$ . Subtract off the fixed cost from part (a) to get  $VC$ .  
ANSWER:  $VC(8245) = \$85$
- (c) HINT: Since items sell for \$15 each, your total revenue is linear:  $TR(q) = 15q$ . Set  $TR$  equal to \$135 and solve for  $q$ :  $q = 9$ . Compute  $TC(9)$  and divide by 9 to get average cost at  $q = 9$ .  
ANSWER:  $AC = \$9.08$