

MATH 111
Exam I – Version 1!
Hints and Answers

1. (a) (4 points) HINT: The graph of p versus q goes through the points (100, 3.30) and (250, 3.00).
ANSWER: $p = -0.002q + 3.5$
- (b) (5 points) HINT: Find the formula for total revenue ($TR = pq$) and the formula for profit (profit = $TR - TC$). The graph of profit is a parabola that opens downward. Max profit occurs at the vertex. Note that you want the maximum value of profit (the “ y ”-coordinate of the vertex).
ANSWER: max profit is profit at $q = 495$: \$478.05
- (c) (4 points) HINT: Find the formula for average cost ($AC = \frac{TC}{q}$), set it equal to 1.55 and solve for q .
ANSWER: $q = 400$ yorbles
- (d) (4 points) HINT: Set TR equal to two times TC ($TR = 2TC$) and solve for q .
ANSWER: $q = 80$ or 150 yorbles
2. (4 points each)
 - (a) ANSWER: $MC(q) = 0.004q + 0.402$
 - (b) HINT: Set MC equal to 4.50 and solve for q .
ANSWER: $q = 1024.5$ Geezbos
 - (c) HINT: Since market price is \$4.50, $TR(q) = 4.50q$. Further, $TC(q) = VC(q) + FC = 0.002q^2 + 0.4q + 400$. Set $TR = TC$ and solve for q . You’ll get a quadratic equation with two positive solutions. You want the smallest.
ANSWER: $q = 102.71$ Geezbos
 - (d) HINT: Find a formula for profit: profit = $TR - TC$. This is a quadratic whose graph is a parabola that opens down. The maximum profit occurs at its vertex.
ANSWER: $q = 1025$ Geezbos
3. (a) (4 points) HINT: Bicyclist B ’s average trip speed is: $\frac{D_B(t)}{t} = \frac{35t - 0.075t^2}{t} = 35 - 0.075t$. Set this equal to 22.25 and solve for t .
ANSWER: $t = 170$ seconds
- (b) (4 points) HINT: Since speed is linear, average speed over the interval from $t = 2$ to $t = 5$ seconds is the speed half-way between $S_A(2)$ and $S_A(5)$. $S_A(2) = 39.56$ and $S_A(5) = 38.9$.
ANSWER: average speed = $\frac{39.56 + 38.9}{2} = 39.23$ feet per second.
- (c) (4 points) HINT: Use the formula developed in Worksheet 17 to get a quadratic distance formula from a linear speed formula.
ANSWER: $D_A(t) = 40t - 0.11t^2$
- (d) (5 points) HINT: Set $D_A(t) = 3500$ and solve for t There are two solutions: $t = 146.61$ and $t = 217.03$. So, bicyclist A gets to the finish line after 146.61 seconds (and would then stop – so the 217.03 is irrelevant. Set $D_B(t) = 3500$ and solve for t . Again, there are two solutions: $t = 145.14$ and $t = 321.53$. So, bicyclist B gets to the finish line after 145.14 seconds.
ANSWER: Bicyclist B wins.