

MATH 111 – EXAM I Hints and Answers
Version Alpha
Autumn 2007

1. (a) i. (3 points) ANSWER: \$1200
ii. (4 points) ANSWER: approximately \$4 per Thing
iii. (4 points) HINT: Use the graph to approximate $TC(200)$ and then subtract off the value of the fixed costs (from part (a)).
ANSWER: approximately \$990
- (b) (5 points) HINT: Draw the graph of TR , a diagonal line with slope 5, and then use the “rolling ruler” method to find the quantity at which the graph of TC has a tangent line parallel to TR .
ANSWER: $q \approx 800$
2. (a) i. (2 points) ANSWER: approximately 7.10 dollars per Item
ii. (2 points) ANSWER: approximately 5.30 dollars per Item
iii. (2 points) HINT: the cost of the 301st Item is the marginal cost at 300
ANSWER: approximately 2.10 dollars
iv. (3 points) HINT: $TC(300) = AC(300) \times 300$
ANSWER: approximately 3030 dollars
- (b) (3 points each)
- i. ANSWER: The graph of marginal revenue is a horizontal line of height 10.
ii. HINT: Profit is increasing as long as $MR > MC$. Look at the graphs.
ANSWER: from $q \approx 70$ to $q \approx 599$
iii. NOTE: Because of a typo in the exam, two different methods give two different answers.
METHOD I: Use the graph of AC to compute $TC(500)$:
$$TC(500) = AC(500) \times 500 \approx 7.30 \times 500 = 3650.$$
Since market price is \$10 each, $TR(500) = \$10 \times 500 = \5000 . Thus, profit is $\$5000 - 3650 = \1350 .
METHOD II: Use the graph of AVC to compute $VC(500)$:
$$VC(500) = AVC(500) \times 500 \approx 5.30 \times 500 = \$2650.$$
Then, $TC(500) = VC(500) + FC = \$2650 + 500 = \$3150$. As in Method I, $TR(500) = \$5000$. So, profit is $\$5000 - 3150 = \1850 .
3. (4 points each)
- (a) HINT: Compute the slope of the secant line through the TTI graph at $t = 2$ and $t = 6$.
ANSWER: approximately \$1.29 per month
- (b) ANSWER: $\frac{p(7) - p(0)}{7} = 1.98$
- (c) HINT: Turn this into a question about slopes: find a time t such that $\frac{p(t+2) - p(t)}{2} = \frac{3}{2}$. To do this, draw a reference line with slope $\frac{3}{2}$ and then slide until your ruler intersects the TTI graph at points that are 2 months apart.
ANSWER: three possible: $t \approx 2.7, 7.2,$ or 9.2 months
- (d) HINT: Sketch the line that has the same “ y ”-intercept as the TTI graph and slope 1.25. Find the time at which this line intersects the TTI graph.
ANSWER: $t \approx 11.9$ months