

MATH 112 B, C
Exam I - Version 1 (Pink)
Hints and Answers

1. (a) ANSWER: $MR(q) = 3q^2 - 30q + 75$, $MC(q) = 20$
(b) HINT: Find the formula for Profit ($P(q) = TR(q) - TC(q)$), compute $P'(q)$, set it equal to 0, and use the quadratic formula to solve for q .
ANSWER: $q = 2.42$ and $q = 7.58$
(c) HINT: Set $TC(q)$ equal to 50, solve for q , and plug that value into the formula for AR .
ANSWER: $AR = 49$ dollars per item
(d) HINT: You should be able to sketch a rough graph of MR . It is a parabola that opens up with its vertex at $q = 5$. Further, since $MR(5) = 0$ and the parabola opens upward, the graph of MR is above the horizontal axis at all quantities (except $q = 5$). You are looking for an interval on which MR is decreasing *and* above the horizontal axis.
ANSWER: from $q = 0$ to $q = 5$
2. (a) HINT: You are looking for $\frac{d(5) - d(2)}{5 - 2}$. Set $m = 2$ and $h = 3$ and plug into the given formula.
ANSWER: 3 feet per second
(b) HINT: You are looking for $d'(10)$. Take the formula you were given for the slope of the secant line and let h go to 0. This gives $d'(m)$.
ANSWER: 108 feet per second
(c) HINT: You are looking for $d(15) - d(0)$. Let $m = 0$ and $h = 15$ in the given formula. This will give $\frac{d(15) - d(0)}{15}$ (which is the average speed over the first 15 seconds). Multiply by 15 to get the distance.
ANSWER: 1395 feet
3. (a) HINT: Set $f'(x) = 0$ and solve for x .
ANSWER: $x = 15$
(b) HINT: You can use the vertex formula on the graph of $g'(x)$. OR You can take the derivative of $g'(x)$ (that derivative would be $-6x + 33$), set it equal to 0, and solve for x .
ANSWER: $x = 5.5$
(c) HINT: The graph of $g'(x)$ is decreasing for all values to the right of its vertex. In addition, you need for the graph of $f'(x)$ to be positive.
ANSWER: from $x = 5.5$ to $x = 15$
(d) HINT: From $x = 0$ to $x = 15$, the graph of $g'(x)$ is positive. At $x = 15$ the graph of $g'(x)$ crosses the x -axis and stays below the x -axis for larger values of x . What does this say about the graph of $g(x)$?
ANSWER: $x = 15$
(e) HINT: Set the formulas for $f'(x)$ and $g'(x)$ equal to each other and use the quadratic formula to solve for x .
ANSWER: $x = 0.67$ and $x = 15$