

MATH 112 – EXAM I Hints and Answers
Version Alpha
Winter 2007

1. (3 points each)

(a) ANSWER: $\frac{dr}{dt} = 4t^3 - 6t^5 + 1$

(b) ANSWER: $h'(x) = \frac{1}{5}x^{-4/5} - \frac{4}{3}\left(-\frac{3}{2}x^{-5/2}\right)$

(c) HINT: $MR(q) = -10q + 80$ and $MC(q) = 3q^2 - 24q + 60$. Set $MR = MC$ and solve for q .

ANSWER: $q = 5.81$

(d) HINT: The speed of the object is given by the derivative of the distance function. Compute $A'(t)$ and $B'(t)$ and evaluate each at $t = 10$.

ANSWER: A is moving faster.

2. (a) (3 points) HINT: Draw the tangent line to TR at $q = 5$ thousand Items and compute its slope. The slope will have units of dollars per Item.

ANSWER: \$3.50 or 3.50 dollars per Item

(b) (3 points) ANSWER: No such interval exists because MR is the derivative of TR . As such, any interval over which TR is increasing is an interval over which MR is positive.

(c) (4 points) HINT: TC is the line with slope 1 and y -intercept 12. Find the quantity at which the tangent line to TR is parallel to TC .

ANSWER: $q = 17$ thousand Items

3. (4 points each)

(a) HINT: Use the given formula to compute $A(6) - A(1)$ (let $m = 1$ and $h = 5$). Then divide by 5 hours to get the rate.

ANSWER: 0.53 gallons per hour

(b) HINT: Divide the given formula by h to get the slope of the secant line. Simplify and then let h go to 0.

ANSWER: $A'(t) = \frac{40}{(2t+3)^2}$

(c) HINT: Set the formula from part (b) equal to 4 and solve for x .

ANSWER: $t = 0.08$ hours

4. (4 points each)

(a) HINT: Set $g'(x)$ equal to 0 and solve for x .

ANSWER: $x = 3.75$

(b) HINT: Either find the vertex of the quadratic function $f'(x)$ OR take the derivative of $f'(x)$ and find where that is equal to 0.

ANSWER: $x = 6.5$

(c) ANSWER: $g'(x)$ is positive after $x = 3.75$. So, $g(x)$ is increasing from $x = 4$ to $x = 10$. $g(x)$ is lowest at $x = 4$.

(d) HINT: The graphs of $f(x)$ and $g(x)$ will be farthest apart when $f'(x)$ and $g'(x)$ are equal. Set $f'(x) = g'(x)$ and solve for x .

ANSWER: $x = 6.79$