

MATH 112 – EXAM I Hints and Answers
Version Alpha
Spring 2009

1. (4 points each)

(a) HINT: Draw the line tangent to A 's distance graph at $t = 1$ and compute its slope.

ANSWER: approximately 1.6 miles per minute

(b) HINT: Remember that $A(8 + h) - A(8)$ is the RISE between two points on the graph of A 's distance at $t = 8$ and $t = 8 + h$. If $A(8 + h) - A(8) = 2$, then $8 + h \approx 9.4$.

ANSWER: $h \approx 1.4$

(c) HINT: First, find the points at which A and B have the **same** instantaneous speed (slide your ruler parallel to B 's distance graph until your ruler is tangent to A 's distance graph). Then consider how the tangent lines would have to look when B is moving faster than A .

ANSWER: from $t = 2.25$ to $t = 7.75$

(d) ANSWER: The graph of B 's instantaneous speed would be a horizontal line, 0.75 units above the t -axis.

2. (a) (5 points) ANSWER: $\frac{f(4+h) - f(4)}{h} = -13 - 2h$

(b) (3 points) ANSWER: $f'(20) = -77$

(c) i. (3 points) HINT: Let $m = 3$ and $h = 0.001$ in the formula for $g(m+h) - g(m)$ to find the value of $g(3.001) - g(3)$. Then, divide by 0.001.

ANSWER: $\frac{g(3.001) - g(3)}{0.001} = 0.079968$

ii. (3 points) HINT: First, find $\frac{g(m+h) - g(m)}{h}$. Then, consider what happens as h approaches 0. This gives $g'(m)$.

ANSWER: $g'(3) = 0.08$

(d) (6 points) HINT: $h(x) = \frac{3}{4}x^{-1/2} + 2 + x^{-1} - x^3 + x$

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

3. (a) HINT: The graph of MR goes through the points $(4, 40)$ and $(24, 15)$. Find the slope and then the equation of the line. Similarly, MC goes through $(4, 6)$ and $(24, 21)$.

ANSWER: $MR(q) = -1.25q + 45$; $MC(q) = 0.75q + 3$

(b) HINT: Set $MR(q) = MC(q)$ and solve for q .

ANSWER: $q = 21$

(c) ANSWER: MR is positive from $q = 10$ to $q = 15$, which means that TR is increasing on that interval. This means that TR will be largest at the higher quantity: $q = 15$ Hundred Things.

(d) HINT: Compute $MC(5.5)$.

ANSWER: 7.125 Dollars (or Dollars per Thing)