

MATH 112 - Spring 2005
Exam I - Version 2
Hints and Answers

1. (a) (4 points) HINT: Use the derivative rules to compute $P'(t)$ and solve the equation $P'(t) = 2.26$ for t .
ANSWER: $t = 5.2$
 - (b) (5 points) HINT: Use the derivative rules to compute $R'(t)$ and $P'(t)$. A quick sketch of these derivatives (they're both lines) will show that the red car goes faster from $t = 0$ until the two speed graphs intersect. So, set $R'(t) = P'(t)$ and solve for t .
ANSWER: from $t = 0$ to $t = 10$
 - (c) (4 points) HINT: There are (at least) two ways to answer this question. First, you just found in part (b) that the speed graphs intersect at $t = 10$. This is the time when the two graphs are farthest apart. If you compute $R(10)$ and $P(10)$, you will see that the two cars are never more than 15 feet apart. On the other hand, you could try solving the equation $R(t) - P(t) = 16$ for t . This will simplify into the quadratic equation $0.15t^2 - 3t + 16 = 0$, which has no solutions. (If you attempt the quadratic formula, you will end up with a negative under the square root.)
ANSWER: The red car is never 16 feet ahead of the purple car.
 - (d) (5 points) HINT: Compute and simplify $\frac{R(m+2) - R(m)}{2}$.
ANSWER: $4.5 - 0.25m$
2. (a) (2 points) HINT: Find the points at which the tangent to $f(x)$ is parallel to $g(x)$.
ANSWER: approximately 0.5 and 12.5
 - (b) (2 points) ANSWER: from $x = 0$ to $x = 2$
 - (c) (2 points) HINT: Draw a line through the point $(11, f(11))$ that has slope $\frac{1}{2}$. Find the other point of intersection of this line with $f(x)$.
ANSWER: $h = 2$
 - (d) (4 points) HINT: Draw the tangent line to $f(x)$ at $x = 10$ and compute its slope.
ANSWER: ≈ -0.5
 - (e) (4 points) ANSWER: You should draw a horizontal line at $y = 0.7$.
3. (a) (2 points) ANSWER: $MR(q) = 12 - 1.2q$
 - (b) (4 points) HINT: Use the formula for $TC(q_2) - TC(q_1)$ with $q_1 = 6$ and $q_2 = 10$: $TC(10) - TC(6) = 18.4$. Then substitute 23.9 in for $TC(10)$ and solve for $TC(6)$.
ANSWER: 5.5
 - (c) (4 points) HINT: Use the formula for $TC(q_2) - TC(q_1)$ with $q_1 = 5$ and $q_2 = 5.0001$. Then divide by 0.0001.
ANSWER: 4.00001
 - (d) (4 points) HINT: Use the formula for $TC(q_2) - TC(q_1)$ with $q_1 = q$ and $q_2 = q + h$. Then divide by h and let h go to 0.
ANSWER: $MC(q) = 0.2q + 3$
 - (e) (4 points) HINT: Set $MR = MC$ and solve for q .
ANSWER: $q = 6.429$