

MATH 112 – EXAM I Hints and Answers
Version Alpha
Spring 2006

1. (4 points each)

(a) ANSWER: $\frac{dz}{dx} = \frac{x^{5/6}(e^x + 4) - (e^x + 4x)(\frac{5}{6}x^{-1/6})}{(x^{5/6})^2}$

(b) ANSWER: $g'(u) = 4(u \ln(u) + 1)^3[u \cdot \frac{1}{u} + \ln(u)]$

(c) ANSWER: $\frac{dy}{dt} = \frac{1}{2}(e^{3t^2} + 1)^{-1/2}(e^{3t^2})(6t)$

2. (a) (4 points) HINT: Let $m = 2$ and $h = 6$ to compute $d(8) - d(2)$.

ANSWER: 60 yards

(b) (4 points) HINT: Let $m = 5$ and $h = 0.01$ to compute $\frac{d(5.01) - d(5)}{0.01}$.

ANSWER: 9.99 yards per minute

(c) (5 points) HINT: Divide $d(m+h) - d(m)$ by h and let h go to zero to get $d'(m) = -2m + 20$. Set $d'(t) = 10.5$ and solve for t .

ANSWER: $t = 4.75$ seconds

3. (a) (4 points) HINT: $TR(4+h) - TR(4) = [-25(4+h)^2 + 200(4+h)] - [-25(4)^2 + 200(4)]$. Expand and simplify.

ANSWER: $TR(4+h) - TR(4) = -25h^2$

(b) (2 points) ANSWER: $MR(q) = -50q + 200$, $MC(q) = 3q^2 - 12q + 17$

(c) (3 points) HINT: $MC(q)$ is a parabola that opens upward. Its smallest value occurs is the “ y ”-coordinate of its vertex.

ANSWER: \$5

(d) (3 points) HINT: Profit is largest at the quantity at which $MR(q) = MC(q)$.

ANSWER: $q = 3.722$ thousand Things

4. (a) (3 points) HINT: $g(x)$ is increasing as long as its derived graph is positive. $g'(x)$ is positive in between the two places where $g'(x)$ crosses the x -axis. Set $g'(x) = 0$ and solve for x .

ANSWER: from $x = 0.5$ to $x = 9.5$

(b) i. (2 points) HINT: Set $f'(x) = 0$ and solve for x .

ANSWER: $x = 3$

ii. (2 points) HINT: $g'(x)$ is a parabola. Its horizontal tangent is at its vertex. (OR Take the derivative of $g'(x)$, set it equal to 0, and solve for x .)

ANSWER: $x = 5$

(c) (3 points) ANSWER: On the interval from $x = 0$ to $x = 2$, $f'(x)$ is negative. This means that $f(x)$ is decreasing on this interval. So, $f(x)$ is highest at the left-most endpoint of this interval: $x = 0$.

(d) (3 points) HINT: $\frac{g(3.00001) - g(3)}{0.00001} \approx g'(3)$

ANSWER: $g'(3) = 65$