

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

1. (a) (5 points) ANSWER: $\frac{du}{dv} = 5 \left(v^{2/3} - e^{v^2} \right)^4 \left(\frac{2}{3} v^{-1/3} - e^{v^2} \cdot 2v \right) + \frac{1}{2} v^{-3/2}$
(b) (5 points) ANSWER: $g'(t) = \frac{(3e^t - t^2) \left(\frac{1}{t^2+t} \right) (2t+1) - [\ln(t^2+t)](3e^t - 2t)}{(3e^t - t^2)^2}$
2. (a) (4 points) ANSWER: $f_x(x, y) = \frac{1}{2}xy^4 - 3y^3 - \frac{4y^2}{x^2}$; $f_y(x, y) = x^2y^3 - 9xy^2 + \frac{8y}{x}$
(b) (4 points) HINT: Compute $h'(3)$, which is equal to $f_y(4, 3)$ (which is equal to 114), and $k'(1)$, which is equal to $f_x(1, -3)$ (which is equal to 85.5).
ANSWER: A is steeper
3. (12 points) HINT: Find the equation of the line that corresponds to the third constraint. This line goes through the points (0, 9) and (15, 0). Its equation is $y = -0.6x + 9$.
ANSWER: The vertices are (5, 3), (5, 6), and (10, 3). The maximum value of $T(x, y)$ is $T(10, 3) = 74.5$ and the minimum value is $T(5, 3) = 48.5$.
4. (a) (6 points) ANSWER: $t = 0.8$ gives a local maximum and $t = 2.5$ gives a local minimum
(b) (4 points) HINT: Plug the critical number ($t = 0.8$) and endpoints ($t = 0$ and $t = 2$) into $B(t)$. Choose the smallest value of $B(t)$.
ANSWER: 5 gallons
(c) (5 points) HINT: $A(t)$ is a quadratic that opens upward. It is decreasing from $t = 0$ to its vertex. Its vertex occurs at $t = 1.6$. From your work on part (a), you should know that $B(t)$ is decreasing in between its critical numbers. (Why?) So, $B(t)$ is decreasing from $t = 0.8$ and $t = 2.5$.
ANSWER: Both are decreasing from $t = 0.8$ to $t = 1.6$.
(d) (5 points) HINT: $D(t) = -10t^3 + 54.5t^2 - 76t + 42.8$. Find the critical numbers. Plug critical numbers and endpoints into $D(t)$ and choose the smallest value.
ANSWER: 11.21 gallons