MATH 112 – EXAM II Hints and Answers
Version Beta
Spring 2009

1. (4 points each)

   (a) ANSWER: $g'(u) = u^4 \cdot 5(3u+1)^4 \cdot 3 + (3u+1)^5 \cdot 4u^3$

   (b) ANSWER: $\dfrac{dv}{dt} = \dfrac{e^{(t^2+4t)} \cdot \left(\frac{2t-6}{t^2-6t}\right) - \ln(t^2-6t) \cdot e^{(t^2+4t)} \cdot (2t+4)}{\left[e^{(t^2+4t)}\right]^2}$

   (c) ANSWER: $h_r(r,s) = 9e^{(rs+r^2s^2)} \cdot (s + 2rs^2)$

   (d) ANSWER: $\dfrac{\partial w}{\partial y} = 2x^3y - \dfrac{1}{xy} \cdot x - 5(y^2+1)^{-6}(2y)$

2. HINTS: The constraints are $x + 3y \leq 63$ and $x + y \leq 25$. The objective function is the profit: $P(x,y) = 3.00x + 3.50y$. The vertices of the feasible region are $(0,0)$, $(0,21)$, $(25,0)$, and $(6,19)$.

   ANSWER: $x = 6$, $y = 19$

3. (a) (8 points) ANSWERS:
   - $D(x) = 4x^3 - 21x^2 + 18x + 2$
   - $D'(x) = 12x^2 - 42x + 18$
   - $D''(x) = 24x - 42$
   - $T(x) = 16x^3 - 63x^2 + 36x + 2$
   - $T'(x) = 48x^2 - 126x + 36$
   - $T''(x) = 96x - 126$

   (b) HINT: Set $D'(x) = 0$ and solve for x.
   ANSWER: $x = 0.5$ and 3

   (c) ANSWER: $D''(0.5) < 0$, which implies that $x = 0.5$ gives a local max. $D''(3) > 0$, which implies that $x = 3$ gives a local min.

   (d) ANSWER: $T''(x)$ is linear and has a positive slope. This means that it has no critical points and its smallest and largest values must occur at the endpoints of the interval: largest $= T''(5) = 354$, smallest $= T''(2) = 66$.