MATH 112

Answers to Extra Multivariable Function Problems

1. (a) $P \approx 3538.35$ hundred Items
   (b) $\dfrac{\partial P}{\partial L} = 0.51L^{-0.7}K^{0.8}$, $\dfrac{\partial P}{\partial K} = 1.36L^{0.3}K^{-0.2}$
   (c) $\sim$7.05 hundred Items

2. (a) $Q_s(r,s) = \left(\dfrac{9s}{r}\right)^3 \cdot 4\left[r\ln(s)\right]^3 \cdot \dfrac{r}{s} + \left[r\ln(s)\right]^4 \cdot 3\left(\dfrac{9s}{r}\right)^2 \cdot \dfrac{9}{r}$
   (b) $(x,y) = (0.2, 25)$

3. (a) $f_x(x,y) = 14 + 6xy$, $f_y(x,y) = -12 + 3x^2$
   (b) $\left(-2, \frac{7}{6}\right)$, $\left(2, -\frac{7}{6}\right)$
   (c) SMALLER
   (d) (i) INCREASING; (ii) CONCAVE DOWN

4. (a) $g_x(x,y) = 6x - 5 + 4xy - y^2$
   (b) $\dfrac{\partial z}{\partial y} = \dfrac{3}{x^2+1} - xe^y + 2\ln y + 2$

5. $A \approx 0$, $B \approx 13$, $C \approx 19$

6. B

7. $f(-1, y)$

8. (a) $f_x(x,y) = -3x^2 + 12y$, $f_y(x,y) = 12x - 8y + 3$
   (b) 30
   (c) i.