

Homework
Exam #12

Chp 13

$$1) f(x, y) = -2x^2 - y^2 + 4x + 4y - 3$$

$$f'_1 = -4x + 4 \quad f'_2 = -2y + 4$$

$$0 = -4x + 4$$

$$0 = -2y + 4$$

$$x = 1$$

$$-4 = -2y$$

$$y = 2$$

$$3.) F(K, L) = 80 - (K-3)^2 - 2(L-6)^2 - (K-3)(L-6)$$

$$F'_1 = -2(K-3) - 1 - (L-6) = .65$$

$$F'_2 = -4(L-6) - (K-3) = 1.2$$

$$-2K - L + 16 = .65$$

$$-4L + 24 - K + 3 = 1.2$$

$$-2K - L = .65$$

$$-3 - 3.5$$

$$2.8$$

$$-4L - 24 - K = 1.8$$

$$-4L = 1.8 + K$$

$$5.75$$

13.2

$$2) C(x, y) = -2x^2 + 4xy + 4y^2 + 40x + 20y - 514$$

$$24x + 12y - 2x^2 + 4xy - 4y^2 + 40x + 20y - 514$$

$$-2x^2 + 4xy - 4y^2 + 64x + 32y - 514$$

$$f'_1 = -4x + 4y + 64$$

$$f'_2 = 4x + 8y + 32$$

$$40 = 16$$

$$24 = 8$$

$$f''_{11} = -4$$

$$f''_{12} = 4$$

$$f''_{22} = -8$$

$$-4(8) - 4$$

$$16$$

13.7 #

3a) $Q = K^{2/3} + L^{1/2} + T^{1/3}$

a. $\pi = p(K^{2/3} + L^{1/2} + T^{1/3}) - rK - wL - qT$

$K = \frac{8}{27} p^{3/2} r^{-3} \quad L = \frac{1}{4} p^2 w^{-2} \quad T = \frac{1}{3\sqrt{3}} p^{3/2} q^{-1/2}$

14.1

1.) a. max s.t. $x + 3y = 24$

$\mathcal{L}(x, y) = xy - \lambda(x + 3y - 24)$ $[\lambda x + 3y\lambda - 24\lambda]$

$\mathcal{L}'_1(x, y) = y - \lambda \quad \mathcal{L}'_2(x, y) = x - 3\lambda$

$0 = y - \lambda \quad 0 = x - 3\lambda$

$x = 3y$

$3y + 3y = 24 \rightarrow 6y = 24 \quad \boxed{y = 4}$

$3x + 12 = 24 \quad 24$

$-12 \quad -12$

$\boxed{x = 12}$

b.

$x = \frac{1}{2} \frac{24}{1} = 12 \quad y = \frac{1}{2} \frac{24}{3} = 4$

14.1 #5

$u(x, y) = 100xy + x + 2y$

$2x + 4y$

$\frac{10000}{2} = x + 2y$

$-2y\lambda + x\lambda + 1000\lambda$

$1000xy + x + 2y - \lambda(2y + x - 1000)$

$100 = x + 2y \quad \mathcal{L}'_1 = 1000y + \lambda =$

$\mathcal{L}'_2 = 1000x + 2 - 2\lambda \quad x = 2y$

$$2y + 2y = 1000$$

$$4y = 1000$$

$$x = 250$$

$$100xy + x + 2y$$

$$25000x + x + 500$$

$$25000(1) + 500 = 10000$$

$$1505$$

$$\frac{2x + 4y}{2} = \frac{1000}{2}$$

$$2x + 2y = 500$$

$$500 + 500$$

$$x = 125$$