Name: _____

1. Find the minimum value of $f(x, y) = x^2 + 4y^2 - 2xy$ subject to 2x + y = 14. (Compare with 7.5 #4.)

2. Find the maximum and minimum values of $f(x, y) = 4x^2 - 6xy + y^2$ subject to the constraint $4x^2 + y^2 = 1$. (Compare with 7.5 #6.)

 $\mathbf{OVER} \rightarrow$

3. Find the maximum and minimum values of $f(x, y) = xe^y$ subject to the constraint $x^2 + y^2 = 2$.

4. Find the maximum and minimum values of f(x, y, z) = 2x + 6y + 3z subject to the constraint $x^2 + y^2 + z^2 = 49$. (Compare with 7.5 #15.)

 $\mathbf{OVER} \rightarrow$

- 5. (Compare with 7.5 #24, #25.)
 - (a) If x thousand dollars is spent on labor and y thousand dollars is spent on equipment, then the output at a certain factory is $Q(x, y) = 30x^{1/3}y^{2/3}$ units. If \$102,000 is available, how should this money be allocated between labor and equipment to generate the largest possible output?

(b) Use the Lagrange multiplier λ to estimate the change in the maximum output of the factory if the available money increases by \$500. (You will need a calculator.)