

**Finance 30210**  
**Quiz #4**

Name \_\_\_\_\_

- 1) Suppose that the price of good X is \$5 and the price of good Y is \$3. You have \$100 to spend and your preferences over X and Y are defined as

$$U(x, y) = x^{\frac{1}{4}} y^{\frac{3}{4}}$$

Calculate your optimal choice of X and Y.

We can write the lagrangian as follows:

$$\ell = x^{\frac{1}{4}} y^{\frac{3}{4}} + \lambda(100 - 5x - 3y)$$

Take the derivative with respect to X and Y:

$$\frac{1}{4} x^{-\frac{3}{4}} y^{\frac{3}{4}} - 5\lambda = 0$$

$$\frac{3}{4} x^{\frac{1}{4}} y^{-\frac{1}{4}} - 3\lambda = 0$$

Solve each for lambda and then set them equal to one another:

$$\frac{\frac{1}{4} x^{-\frac{3}{4}} y^{\frac{3}{4}}}{5} = \lambda = \frac{\frac{3}{4} x^{\frac{1}{4}} y^{-\frac{1}{4}}}{3}$$

Rearrange and simplify to get

$$y = 5x$$

Plug into the budget constraint

$$5x + 3y = 100 \Rightarrow 5x + 3(5x) = 100 \Rightarrow x = 5, y = 25$$