# Microeconomic Guidelines: Two Goods Model

## Our Parameters:

These are given to us and we work *with* them:

Price of Good X: $p_X$

Price of Good Y: $p_Y$

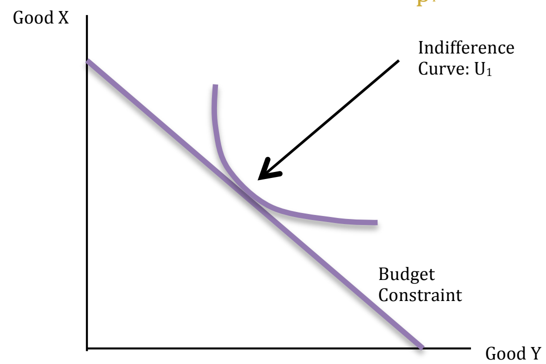
Income: M

## Our Model:

**Objective Function:** U(X,Y) *gradient:* $\frac{\delta U / \delta X}{\delta U / \delta Y}$

**Budget Constraint:** $p_X X + p_Y Y = M$ *gradient:* $\frac{p_X}{p_Y}$

At **Equilibrium**, given $p_X$, $p_Y$ and M we must find the demand for Goods X and Y, where **MRSx,y,** $= \frac{p_X}{p_Y}$




## Endogenous Variables:

These are the results of the model and it is up to us to calculate them:

X* (the optimal quantity of Good X)

Y* (the optimal quantity of Good Y)

U* (the highest affordable level of Utility, given by X* and Y*)

We can use the **LaGrange Function** to solve in the form:

L = **Objective Function** + **λ(Budget Constraint=0)**

*For example:* $X^2Y^2 + \lambda(M - p_X X + p_Y Y)$

*Partially Differentiate with respect to X, Y and* $\lambda$

$$\frac{\partial L}{\partial X} = 0$$

$$\frac{\partial L}{\partial Y} = 0$$

$$\frac{\partial L}{\partial \lambda} = 0$$

Then Eliminate the $\lambda$ by rearranging the first two differentials to equal $\lambda$ and so making them equate. This is the same setting **MRSx,y,** $= \frac{p_X}{p_Y}$

Finally, Substitute your answers into the Budget Constraint (the third differential) to find X* and Y*

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