

Study Questions—Market and Utility

1. A market has demand and supply equations

$$Q_d = 1000 - 5P + .1I + P_s$$

$$Q_s = -200 + 4P$$

Income, I , is currently 200

The price of a substitute, P_s , is currently 5

Use the above information to calculate:

- Equilibrium price and quantity
- Price elasticity of demand at equilibrium
- Income elasticity of demand at equilibrium
- Cross elasticity of demand at equilibrium

2. Yolanda has utility function $U = X^6Y^4$. She has \$200 to spend. Y cost \$1 each; X cost \$2 each.

Calculate:

- Yolanda's utility-maximizing demand for X and Y
- Yolanda's marginal rate of substitution at her utility-maximizing point.
- Three points (price, quantity) on Yolanda's demand curve for Y

1 a) Plug I and P_s values into the demand equation:

$$Q_d = 1000 - 5P + .1(200) + 5 \rightarrow Q_d = 1025 - 5P$$

$$\begin{aligned} \text{Set } Q_d = Q_s \rightarrow & 1025 - 5P = -200 + 4P \\ & 1225 = 9P \\ & 136.111 = P \end{aligned}$$

Plug P into supply curve (or demand curve) to get Q:

$$Q = -200 + 4(136.1111) = 344.4444$$

b) $dQ/dP \times P/Q = -5 \times (136.1111/344.4444) = -1.9758$ (elastic)

c) $dQ/dI \times I/Q = .1(200/344.444) = .058$ (a normal good)

d) $dQ/dP_s \times P_s/Q = 1 \times (5/344.4444) = .01452$

2. a) $X = .6(200)/2 = 60$ $Y = .4(200)/1 = 80$

b) $MRS = P_y/P_x$ at utility-maximizing point, so $MRS = 1/2 = .5$

c) One point we already have: at $P_y = 1$, $Y = 80$

Another point: at $P_y = \$2$, $Y = .4(200)/2 = 40$

Another point: at $P_y = \$3$, $Y = .4(200)/3 = 26.66667$