Solution to EXAM 1
June 28, 2013

Q1:

(1). $Q^d = Q^s \rightarrow 120 - 0.2p = 20 + 4.8p \rightarrow p^* = 20, Q^* = 116$

(2). There is shortage!

$$Q^d = 120 - 0.2 \times 15 = 117$$

$$Q^s = 20 + 4.8 \times 15 = 92$$

(3). $Q^d = Q^s \rightarrow 120 - 0.2p = 20 + 9.8p \rightarrow p^* = 10, Q^* = 118$

(4). This question is tricky, note that in this case the price ceiling is set above the equilibrium price in Guelph, so it has no impact on the local housing market! The market price will stay at its equilibrium price, \$10! Market clears, neither surplus nor shortage exists!

$$Q^d = 120 - 0.2 \times 10 = 118$$

$$Q^s = 20 + 9.8 \times 10 = 118$$

Q2:

(1). See figure 1 attached

(2). See figure 2 attached

(3). See figure 3 attached.

(4). See figure 4 attached.

Q3:

(1). Use the trick introduced in class we can quickly write down the quantity demanded for x, y,and z:

$$\begin{cases} x^* = \frac{0.4 \times I}{p_x} = \frac{0.4 \times 100}{1} = 40 \\ y^* = \frac{0.3 \times I}{p_y} = \frac{0.3 \times 100}{3} = 10 \\ z^* = \frac{0.3 \times I}{p_z} = \frac{0.3 \times 100}{6} = 5 \end{cases}$$

(2).

$$MRS = MRT$$

$\Longrightarrow$

$$\frac{U_x}{U_y} = \frac{p_x}{p_y}$$

$\Longrightarrow$

$$\frac{0.5 \times (x-10)^{-0.5}(y-20)^{0.5}}{0.5 \times (x-10)^{0.5}(y-20)^{-0.5}} = \frac{1}{2}$$

$\Longrightarrow$

$$\frac{y-20}{x-10} = \frac{1}{2}$$

$\Longrightarrow$

$$x = 2y - 30$$

Plug the above relationship between x and y into the budget constraint, we have

$$\begin{cases} x = 2y - 30 \\ x + 2y = 100 \end{cases}$$

$\Longrightarrow$

$$2y - 30 + 2y = 100$$

$\Longrightarrow$

$$y^* = \frac{130}{4} = \frac{65}{2} = 32.5$$

$\Longrightarrow$

$$x^* = 2y^* - 30 = 2 \times 32.5 - 30 = 35$$

Q4:

If you can draw the indifference curve for the utility function correctly, it is not hard to find the solution. Optimal bunble implies $x = y$, use the composite good method introduced in class, we can construct a fictitious composite good z, where $p_z = p_x + p_y = 5$, so $z^* = \frac{I}{p_z} = \frac{100}{5} = 20$, which implies $x^* = y^* = 20$.

Q5:

(1).

$$\epsilon = \frac{dD}{dp}\frac{p}{D} = 0.5p^{-0.5}m^{0.5}n^{0.5}z^{0.5} \times \frac{p}{p^{0.5}m^{0.5}n^{0.5}z^{0.5}} = 0.5$$

(2).

$$\eta = \frac{dS}{dp}\frac{p}{S} = \frac{1}{p} \times \frac{p}{S} = \frac{1}{S} = \frac{1}{0 + 10} = 0.1$$

(3).

$$\vartheta = \frac{dD}{dp_o}\frac{p_o}{D} = \frac{0.5}{p_o^{0.5}} \times \frac{p_o}{D} = \frac{0.5}{2} \times \frac{4}{3} = \frac{1}{3}$$

(4).

$$\varphi = \frac{dD}{dI}\frac{I}{D} = \frac{1}{p} \times \frac{y}{D} = \frac{1}{p} \times \frac{y}{\frac{y}{p}} = 1$$

Figure 1

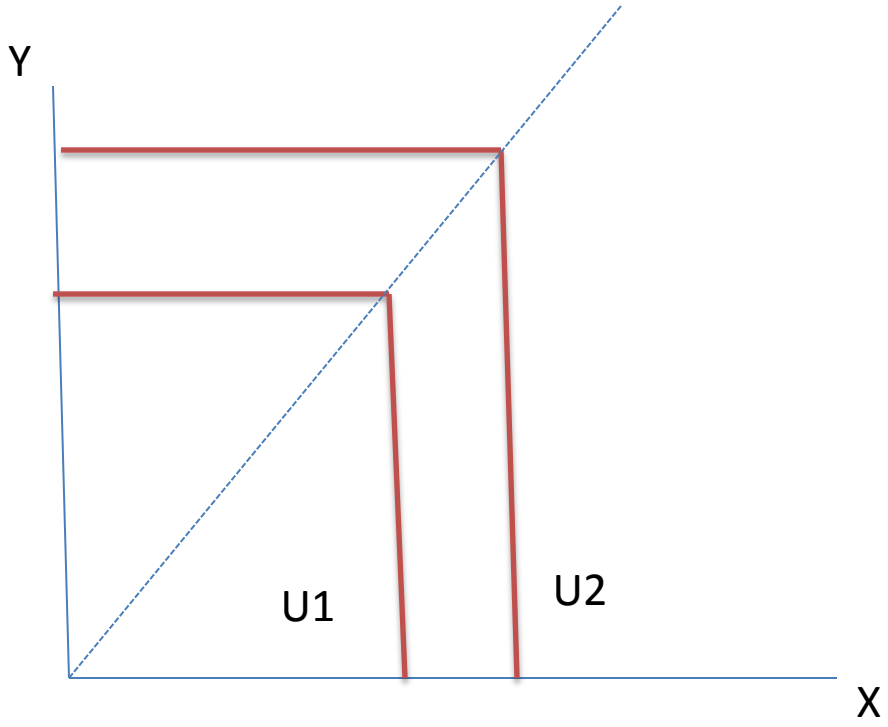

Figure 2

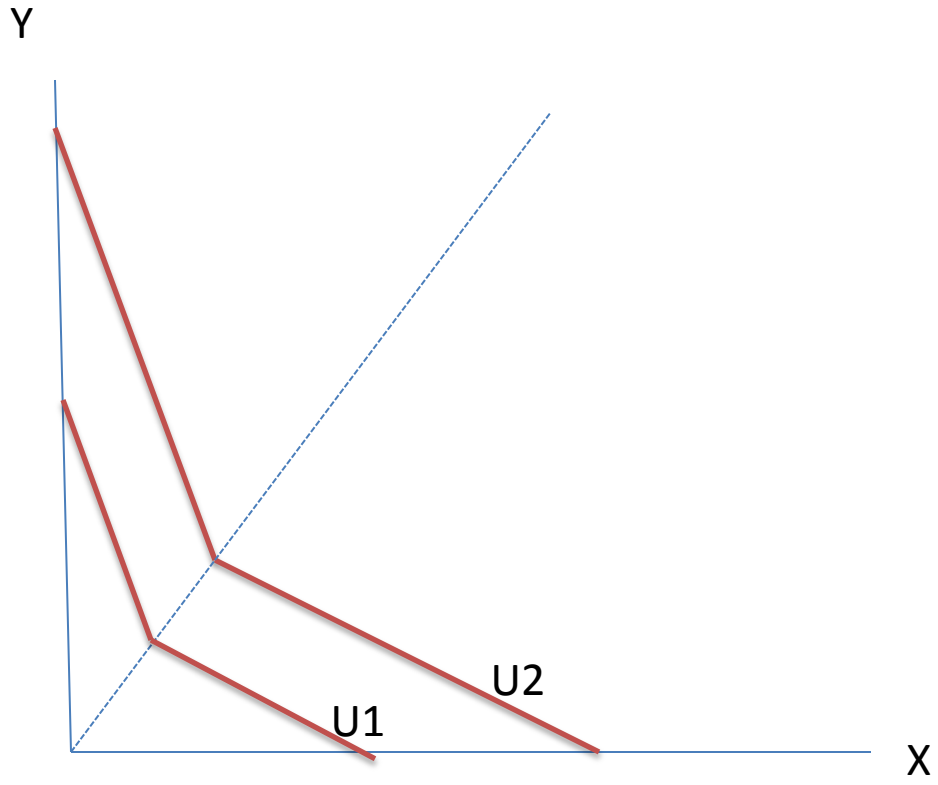

Figure 3

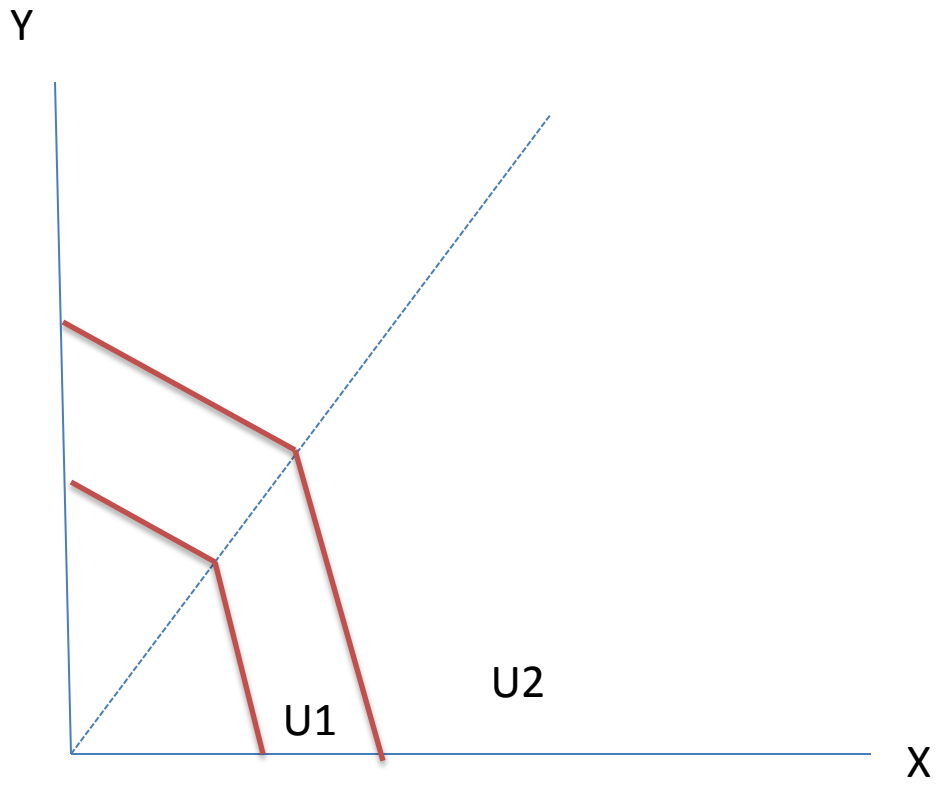

Figure 4