Exam 1

You have 60 minutes for this exam. There are five questions in this exam.

Question 1: [20 points] In this question we focus on the housing market in Toronto, Canada. Suppose that we know the demand function for a two-bedroom apartment in Toronto is $Q^d = 120 - 0.2P$ and the supply function for the two-bedroom apartment in Toronto is $Q^s = 20 + 4.8P$:

1. solve for the competitive market equilibrium.
2. suppose that Toronto Mayor Rob Ford has adopted a price ceiling policy for the housing market by setting the ceiling price which is $15. Calculate the quantity demanded and quantity supplied at the ceiling price. Is there a surplus or shortage in the housing market with this policy?
3. because of the market inefficiency in part (2), many people who are planning to settle in Toronto instead decide to buy an apartment in Guelph, a small city which is about 30 miles west of Toronto. Suppose the demand curve for housing in Guelph is the same as in Toronto, $Q^d = 120 - 0.2P$, but the supply curve in Guelph is $Q^s = 20 + 9.8P$. Solve for the competitive market equilibrium in Guelph.
4. suppose that Guelph Mayor also has adopted a price ceiling policy for the housing market by setting the ceiling price which is $15. Calculate the quantity demanded and quantity supplied at the ceiling price. Is there a surplus or shortage in the housing market with this policy in Guelph?

Question 2: [20 points] Draw indifference curves for the following utility functions, label all relevant points:

1. $U(x, y) = \max(x, y)$
2. $U(x, y) = 2\min(x, y) + \max(x, y)$
3. $U(x, y) = 2\max(x, y) + \min(x, y)$
4. $U(x, y) = \ln x + y$

Question 3: [25 points] Suppose that you have this Cobb–Douglas utility function, $U(x, y, z) = x^{0.4}y^{0.3}z^{0.3}$, $p_x = 1$, $p_y = 3$, $p_z = 6$. Total income is 100.

1. Find the demand of x, y and z which maximize the utility function.
2. Now you have this new utility function, $U(x, y) = (x - 10)^{0.5}(y - 20)^{0.5}$. This function is called Stone–Geary function which is just a variant of Cobb–Douglas function. It is proposed to capture the idea that people may need to have a minimum amount of certain goods in order to survive, for example, daily nutrition or calory intake. Notice that if x is less than 10, the utility will be negative irrelevant of the amount of y consumed. Prices and income are, $p_x = 1$, $p_y = 2$, $I = 100$. Find the demand of x and y which maximize the utility function in this case.

Question 4: [15 points] Suppose that you have this utility function, $U(x, y) = 2\min(x, y) + \max(x, y)$, the price for good x is 1 and the price for good y is 4. Total income is 100. Find the demand of x and y which maximize the utility function.

Question 5: [20 points]

1. Suppose that you have this demand function, $D(p) = p^{0.5}m^{0.5}n^{0.5}z^{0.5}$, and you know $p = m = n = z = 82$. What is the **price elasticity of demand**?
2. Suppose that you have this supply function, $S(p) = \ln p + 10$, and you know $p = 1$. What is the **price elasticity of supply**?
3. Suppose that you have this demand function, $D(p) = p^{0.5} + p_o^{0.5}$, and you know $p = 1$ and $p_o = 4$. What is the **cross–price elasticity of demand**?
4. Suppose that you have this demand function, $D(p) = \frac{y}{p}$ where y is income. You know $y = 120$ and $p = 400$. What is the **income elasticity of demand**?