Homework 2 due May 31 (within 10 minutes after the class ends)
Total points: 100
Student's Name:

Please show your work only whenever it is indicated and make sure your writing is clear. Attach all the sheets with a stapler.

Problem 1 (15 points):

Graph Each of the following budget constraints. Be sure to label all intercepts and clearly label each constraint.

a) (5 points) $p_x = 1, p_y = 2, I = 100$

b) (5 points) $p_x = 2, p_y = 2, I = 200$

c) (5 points) $p_x = 3, p_y = 6, I = 150$

Problem 2 (10 points):

Suppose there are 2 goods, X and Y, and utility function of the consumer is $U(X,Y) = 5X^2Y^3$. $MU_X = 10XY^3$ and $MU_Y = 15X^2Y^2$

a) (5 points) derive demand functions for X and Y.

b) (5 points) Suppose $I = 10$, $p_X = 1$, $p_Y = 2$. What is the optimal bundle?

Problem 3 (15 points):

Suppose $U(X,Y) = \min\{aX, bY\}$ where $a > 0, b > 0$. Also suppose that $p_X > 0, p_Y > 0$. Derive demand functions for X and Y. Show your work.

Problem 4 (20 points):

Suppose $U(X,Y) = aX + bY$ where $a > 0, b > 0$. $MU_X = a$ and $MU_Y = b$.

a) (10 points) Derive demand functions for X and Y. Show your work.

b) (10 points) Graph demand for X at $I = 100, p_Y = 1$, $a = 2, b = 1$.

Problem 5 (40 points):

Suppose $U(X,Y) = X^\alpha Y^\beta$ where $\alpha > 0, \beta > 0$. $MU_X = \alpha X^{\alpha-1}Y^\beta$and $MU_Y = \beta X^\alpha Y^{\beta-1}$. Assume also that $p_X = p_Y = p$.

a) (5 points) Find the demand of X and Y as functions of p and I.

b) (5 points) Find the expression for the utility that the consumer is getting from the optimal bundle (substitute demand functions that you derived in part a in the utility function).

c) (5 points) suppose price of X becomes $p_X = \frac{\alpha}{\beta}p$ while price of Y remains at $p_Y = p$. Solve for the new optimal bundle.

d) (10 points) What is the substitution effect of the price change in terms of X? Show your work.

e) (5 points) What is the condition on α and β under which the substitution effect derived in part d is positive. Interpret the condition.

f) (5 points) What is the income effect of the price change in terms of X?

g) (5 points) What is the condition on α and β under which the income effect is positive. Interpret the condition.