ADDIS ABABA SCIENCE AND TECHNOLOGY UNIVERSITY
DEPARTMENT OF SOFTWARE ENGINEERING
Introduction to Economics -Individual Assignment (10%)

1. Given utility function $U = X^{0.5} Y^{0.5}$ where PX = 12 Birr, Birr, PY = 4 Birr and the income of the consumer is, M= 240 Birr.
   A. Find the utility maximizing combinations of X and Y.
   B. Calculate marginal rate of substitution of X for Y (MRSX, Y) at equilibrium and interpret your result.

2. A person has $ 100 to spend on two goods X and Y whose respective prices are $3 and $5.
   A. Draw the budget line.
   B. What happens to the original budget line if the budget falls by 25%?
   C. What happens to the original budget line if the price of X doubles?
   D. What happens to the original budget line if the price of Y falls to $4?

3. A rational consumer spends all of her income on two goods: Apple and Banana. Suppose the last dollar spent on Apple increased her total utility from 60 utils to 68 utils and the last dollar spent on Banana increased her total utility from 25 utils to 29 utils. If the price of a unit of Apple is 2 Birr, what is the price of a unit of Banana at equilibrium?

4. Suppose a particular consumer has 8 birr to be spent on two goods, A and B. The unit price of good A is 2 birr and the unit price of B is 1 birr. The marginal utility (MU) she gets from consumption of the goods is given below

Quantity	MU_A	MU_B
1	36	30
2	24	22
3	20	16
4	28	12
5	16	10
6	10	4

   A) Based on the cardinal analysis, what is the combination of the two goods that gives maximum utility to the consumer?
   B) What is the total utility at the utility maximization level?

5. Suppose the production function a firm producing Q requires the use of only labor and capital. The production function for the product is given by:
   $Q=L^{1/4}K^{3/4}$. The amount of capital used is fixed at 5 units. Then,
   A. Determine MP_L and AP_L function
   B. Determine MP_K and AP_K function

6. Suppose the production function is given by $Q(L,K) = L^{3/4}K^{1/4}$. Assuming capital is fixed, find AP_L and MP_L

7. Consider the following short run production function:

$$Q = 6L^2 - 0.4L^3$$

   A. Find the value of L that maximizes output
   B. Find the value of L that maximizes marginal product
   C. Find the value of L that maximizes average product

8. Given a short run cost function as $TC = \frac{1}{3}Q^3 - 2Q^2 + 60Q + 100$, find the minimum value of AVC and MC.

9. A firm operates in a perfectly competitive market. The market price of its product is 4 birr and the total cost function is given by $TC = \frac{1}{3}Q^3 - 5Q^2 + 20Q + 50$, where TC is the total cost and Q is the level of output.
   A. What level of output should the firm produce to maximize its profit?
   B. Determine the level of profit at equilibrium.
   C. What minimum price is required by the firm to stay in the market

10. Suppose there is a perfectly competitive industry where all the firms are identical with identical cost curves. Furthermore, suppose that a representative firm's total cost is given by the equation $TC=100+q2+q$ where q is the quantity of output produced by the firm. You also know that the market demand for this product is given by the equation $p=1000-2$. Where q is the market quantity. Then using the above information determines the following.

    a. What is the profit maximizing quantity and price in this market?
    b. profit at this market equilibrium (3 points)

11. Consider the following information for a particular economy
    Total population = 60 million Number of employed = 30 million
    Total labor force = 40 million Natural rate of unemployment = 12%
    a) Find the total unemployment rate
    b) Calculate the cyclical unemployment rate
12. Consider an economy that produces and consumes **Bread** and **Automobile**. Data for two different years 2005 and 2010 is given in the following table.

Year	2005	2010
Price of Automobiles	$ 5000	$ 6000
Price of a loaf of bread	$10	$20
Number of automobiles produced	100	120
Number of loaves of bread produced	500,000	400,000

Using the year 2005 as a base year,
a) Calculate the nominal and real GDP of 2010.
b) Find the value of GDP Deflator for the year 2010 and interpret.
c) Calculate the inflation rate in 2010