Question 1  Consumer preferences are depicted below:

1. Suppose prices are $p_1 = 3$, $p_2 = 1$ and that income is $I = 15$. Then the optimal consumption is $x_1 = \underline{\hspace{2cm}}$, $x_2 = \underline{\hspace{2cm}}$.  

2. Suppose that $(8, 9)$ is the optimal consumption and that $p_1 = 6$.

Then $p_2 = \underline{\hspace{2cm}}$, $I = \underline{\hspace{2cm}}$.  

3. Suppose that $(10, 0)$ is the optimal consumption and that $p_1 = 60$. Then

$p_2 \leq \underline{\hspace{2cm}} \geq \underline{\hspace{2cm}}$  
(Circle the correct sign and fill in the correct number).
**Question 2** A demand function is given by \( Q_D(P) = 300 - 3P \). Then the price elasticity of demand is given by

\[
\epsilon^P_D = \quad 5 \text{ points}
\]

We will learn that if \( Q_D(P) \) is the demand for a firm’s product when the price is \( P \) Dollars per unit, then the firm’s revenue is maximized if demand is unit-elastic, i.e., if the price elasticity is -1. Thus,

**Revenue is maximized at price** \( P = \quad 5 \text{ points} \)

At this price, demand is \( Q = \quad \) and **revenue is** \( \quad \).
**Question 3** Suppose that the demand for unskilled labor in a particular country is \( Q_D(P) = 200 - 0.1P \), where \( P \) is the monthly wage. The supply is currently given by \( Q_S(P) = 50 + 0.05P \). Thus, the equilibrium wage is given by \( P = \) . 4 points

Now, suppose that because of immigration, the supply of unskilled labor triples to \( 3Q_S(P) \) (demand stays the same). Thus, the new equilibrium wage is \( P = \) . 4 points

Thus, who is more likely to favor legislation that opposes immigration: Unions representing unskilled labor or firms hiring unskilled workers? Explain in one sentence below: 3 points

Suppose the government imposes a minimum monthly wage of \( P = 500 \) (supply is still \( 150 + 0.15P \)). Then the excess supply of labor is \( \% \) of the demand for labor (this would be measure for the percentage of unskilled workers that are unemployed). 4 points
Question 4 Suppose that demand is linear. At a price of \( P = 20 \) demand is \( Q = 30 \) and the demand elasticity is \(-0.5\). Then demand is given by

\[
Q_D(P) = \ldots
\]

6 points

Thus, if the price is \( P = 10 \) the demand elasticity is

4 points

(The answer must be a number!)
Question 5 Suppose an oil company has supplies of four crude products. In the refinery
the crude products can be used to make two refined products $x_1$ and $x_2$, which the
company can sell at prices 3 and 1, respectively. In order to produce $x_1$ units of
the first refined product one needs 1 unit of crude product 1, 2 of product 2, 4 of
product 3, and 1 of product 4. In order to produce $x_2$ units of the second refined
product one needs 1 unit of crude product 1, 1 unit of product 2, 1 of product 3,
and 3 of product 4. The company has a fixed supply of the crude products. In
particular supplies of the crude products are 30, 44, 80, and 72 units, respectively.
The company wants to maximize the total revenue from selling the product. As a
consequence, the company solves the following optimization problem.

$$\max_{x_1, x_2} 3x_1 + x_2 \quad \text{subject to}$$

(i) $x_1 + x_2 \leq 30$
(ii) $2x_1 + x_2 \leq 44$
(iii) $4x_1 + x_2 \leq 80$
(iv) $x_1 + 3x_2 \leq 72$
(v) $x_1 \geq 0$
(vi) $x_2 \geq 0$.

Determine the optimum graphically. *Indicate the feasible set by shading it!* 15 points

At an optimum $x_1 =$ \hspace{1cm} $x_2 =$ \hspace{1cm}

The maximum revenue is \hspace{1cm}.

*Use the grid on the following page*
Question 6 A utility function is given by $u(x_1, x_2) = \min\{x_1, 3x_2\}$. Suppose that prices are $p_1 = 3$ and $p_2 = 1$. The person's income is $I = 30$. Determine the optimal choice graphically. Graph at least three indifference curves, including the one through the optimal choice point.

At the optimal choice, $x_1 = \quad x_2 = \quad 15$ points

15 points
Question 7  An indifference through (6, 20) is depicted below. Determine the following graphically and write the answers in the boxes.

(a) The least costly consumption bundle that gives the same utility as (6, 20) at price $p_1 = 3$, $p_2 = 2$ is $x_1 = \quad x_2 = \quad 5$ points

(b) At prices $p_1 = 2$, $p_2 = 8$ how much money does the person need to get the same utility as (6, 20) $I = \quad 5$ points
Question 8  Suppose that demand for a product is \( Q_D(P) = 200 - 4P \). Supply is given by \( Q_S(P) = 10 + P \). The government pays a subsidy of 10 Dollars per unit to suppliers. Then

| The equilibrium price before the subsidy is \( P = \) |  |
| The equilibrium price after the subsidy is \( P = \) |  |
| The government’s total subsidy payment is | 10 points |