Question 1  Suppose that a demand function is given by $Q_D(P) = 20 - 10P$. Then
\[ \text{the price elasticity of demand is } \epsilon^P_D = . \] 5 points

Question 2  Suppose $x = (8, 8)$ and $x' = (2, 26)$ are on the budget line. Further, suppose that the price of good 2 is $P_2 = 2$. Then
\[ \text{the price of good 1 is } P_1 = . \] 5 points
(a) Suppose that the utility function is \( u(x_1, x_2) = 2x_1 + x_2 \). Graph the indifference curves through \((6, 6), (10, 10), (16, 16), \) and \((20, 20)\), using the grid above.  

(b) Graph a budget line such that \((0, 30)\) is the optimal consumption choice. Clearly indicate the budget set by shading it.
Question 4 A firm wants to produce two outputs, \( x_1, x_2 \) from three inputs that are subject to resource constraints. Furthermore, the firm wants to produce more of good 1 than of good 2. The firm solves

\[
\begin{align*}
\max_{x_1, x_2} & \ 2x_1 + x_2 \\
\text{subject to} & \ (1) \ x_1 \geq x_2; \\
& \ (2) \ 3x_1 + x_2 \leq 48; \\
& \ (3) \ x_1 + x_2 \leq 20. \\
& \ (4) \ x_1 \geq 0, \ (5) \ x_2 \geq 0.
\end{align*}
\]

Determine the optimal choice of \( x_1 \) and \( x_2 \), graphically. Clearly indicate the feasible set by shading it. You must also graph some lines that represent the objective.

\( x_1 = \), \( x_2 = \).

15 points
Question 5 A person’s preferences for food and housing are indicated below.

Housing

(a) In 2000, the price of a unit of food is $P = 400$ and the price of a unit of housing is $P = 400$. Suppose that the person’s income is $I = 8,000$. Then

\[
\text{The optimal choice in 2000 was } x_1 = \quad , x_2 = \quad
\]
(b) In 2004, the price of housing increases to $P = 1,600$. The price of food stays the same. If you use the consumption choice in (a) to determine a price index, then

\[ \text{The inflation rate is } \% \]

5 points

(c) Determine the following graphically: If, in 2004, the person has just enough income to be as well off as in 2000, then

\[ \text{The optimal choice in 2004 is } x_1 = \text{, } x_2 = \]

5 points

(d) If you use your result from (c) to compute the “true” rate of inflation then

\[ \text{the inflation rate is } \% \]

5 points
Question 6 Suppose the government considers rationing the consumption of gasoline. That is, the price of a unit of gasoline is \( p_G = 0.2 \). However, a person can only purchase 15 units. The consumer has an income of \( I = 30 \). Each unit of good 2 (all other goods) costs 1 Dollar. The consumer’s preferences are depicted below.

Other goods

(a) Graph the budget set—clearly indicate the budget set by shading it. Find the optimal consumption choice, and graph the indifference curve through the optimal consumption point.

Optimal choice: \( 15 \) units of gasoline, and \( 30 \) units of other goods
(b) Suppose that rationing is lifted. As a consequence, the price of gasoline adjust such that the representative consumer depicted above chooses to purchase 12 units of gasoline. Graph the budget line at which it is optimal to purchase 12 units of gasoline.

Without rationing, the price of gasoline will be $

\textbf{Question 7 }$ Suppose that the supply for a product is linear, i.e., of the form $Q_S(P) = a + bP$, where $a, b > 0$. At a price of $P = 20$ supply is 40 units. The price elasticity of supply is 0.1. The supply function is therefore given by

\[ Q_S(P) = \]
**Question 8** The demand function for corn in a particular country is \( Q_D(P) = 300 - 0.05P \). The domestic supply of corn is is given by \( Q^d_S(P) = 50 + 0.04P \). The foreign supply is \( Q^f_S(P) = 200 + 0.01P \).

(a) Suppose that there is no tariff on imported corn, and that the foreign government does not subsidize farmers. Total supply of corn is therefore given by 
\[
Q_{\text{total}} = Q^d_S(P) + Q^f_S(P) = (50 + 0.04P) + (200 + 0.01P).
\]
The equilibrium price and quantity of corn sold in the country are therefore given by

\[
P = \\
Q = \]

(b) Now suppose that the government imposes a tariff of 10% on foreign imports. 
\[
Q^f_S(0.9P) = 200 + 0.01(0.9P).
\]
As a consequence of the tariff, 
the price of corn will increase by \( \) \%
(e) Now suppose that because of bad harvest abroad, foreign supply decreases by 10 percent, i.e., foreign supply is now $0.9Q_d^f(P)$. Suppose that as in (a) the government does not impose a tariff on foreign imports.

As a consequence, 8 points

the price of corn will increase by . %