**Question 1**


1. Suppose prices are $p_1 = 1$, $p_2 = 2$ and that income is $I = 30$. Then the optimal consumption is $\boxed{x_1 = 30, x_2 = 0}$. *5 points*

2. Suppose that $(12, 4)$ is the optimal consumption. Then the budget line must have the same slope as the indifference curve, i.e., $p_1/p_2 = 2/3$. Since $p_1 = 6$, $p_2 = 9$. $\boxed{p_2 = 9, I = 108}$. *5 points*

3. Suppose that $(10, 0)$ is the optimal consumption and that $p_1 = 12$. Then $p_1/p_2 \leq 2/3$. Thus, $\boxed{p_2 \leq 18}$. *5 points*

**Question 2** A demand function is given by $Q_D(P) = 100 - 2P$. Then the price elasticity of demand is given by

$\boxed{\epsilon_D^P = \frac{-2P}{100-2P}}$. *5 points*

$\frac{-2P}{100-2P} = -1$ implies $2P = 100-2P$, i.e., $P = 25$. $\boxed{\text{Revenue is maximized at price } P = 25}$.

At this price, demand is $\boxed{Q = 50}$ and $\boxed{\text{revenue is 1,250}}$. *5 points*

**Question 3** At equilibrium $140 - 0.2P = 50 + 0.1P$. Thus, the equilibrium wage is given by $\boxed{\boldsymbol{P = 300}}$. *4 points*

Now, $140 - 0.2P = 100 + 0.2P$. Thus, the new equilibrium wage is $\boxed{\boldsymbol{P = 100}}$. *4 points*

Restriction on immigration will result in a higher wage for unskilled workers. Thus, unions representing such workers may favor such restrictions.

At $P = 200$, demand is 100. Supply is 140. Thus, the excess demand for labor is $\boxed{\textbf{40 \%}}$ of the total demand of labor. *4 points*

**Question 4** Suppose that demand is linear. At a price of $P = 10$ demand is $Q = 30$ and the the demand elasticity at $-2$. Thus, $-2 = \frac{-bP}{Q} = \frac{-10b}{30}$. Thus, $b = 6$. Therefore, demand is $Q = a - 6P$. Thus, $30 = a - 60$, i.e., $a = 90$.

Then demand is given by

$\boxed{\boldsymbol{Q_D(P) = 90 - 6P}}$. *6 points*

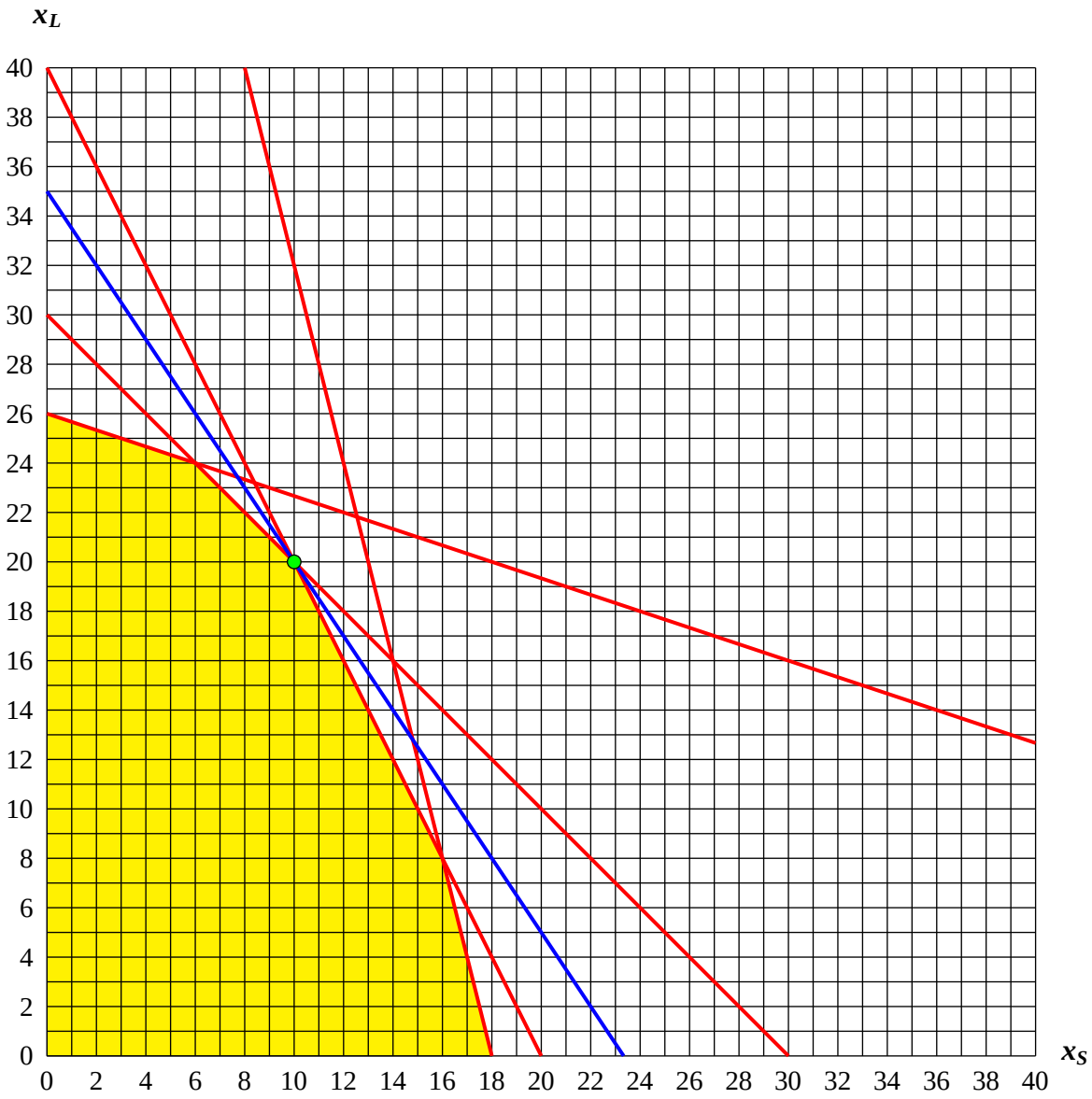
Thus, $\epsilon = \frac{-6P}{90-6P}$. Therefore

$\boxed{\textbf{if the price is } \boldsymbol{P = 5} \textbf{ the demand elasticity is } \boldsymbol{-0.5}}$. *4 points*

**Question 5** *15 points*

$\boxed{\textbf{At an optimum } \boldsymbol{x_1 = 10, x_2 = 20}}$

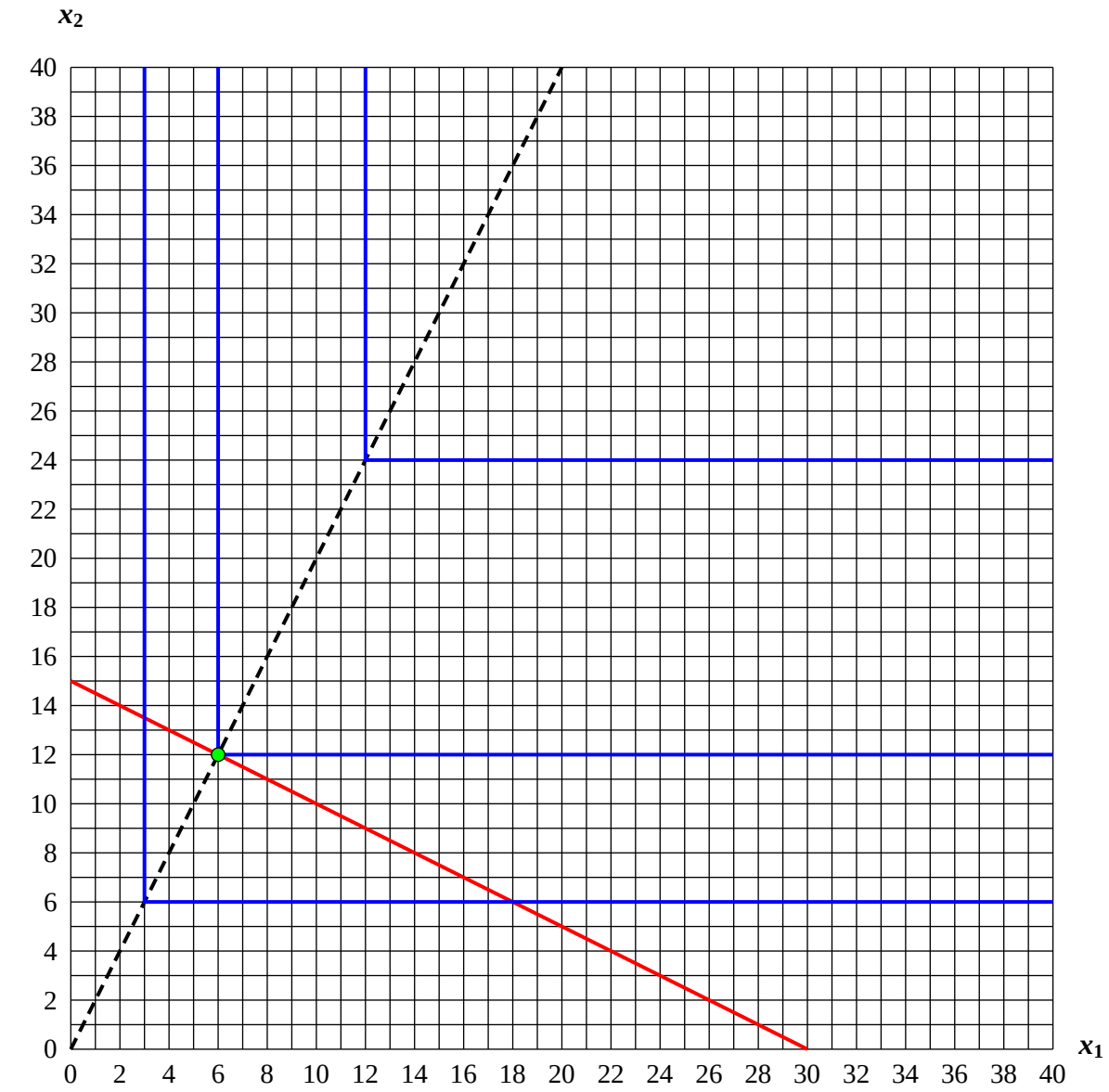
$\boxed{\textbf{The maximum revenue is 70}}$




**Question 6**

**At the optimal choice, $x_1 = 6$, $x_2 = 12$**

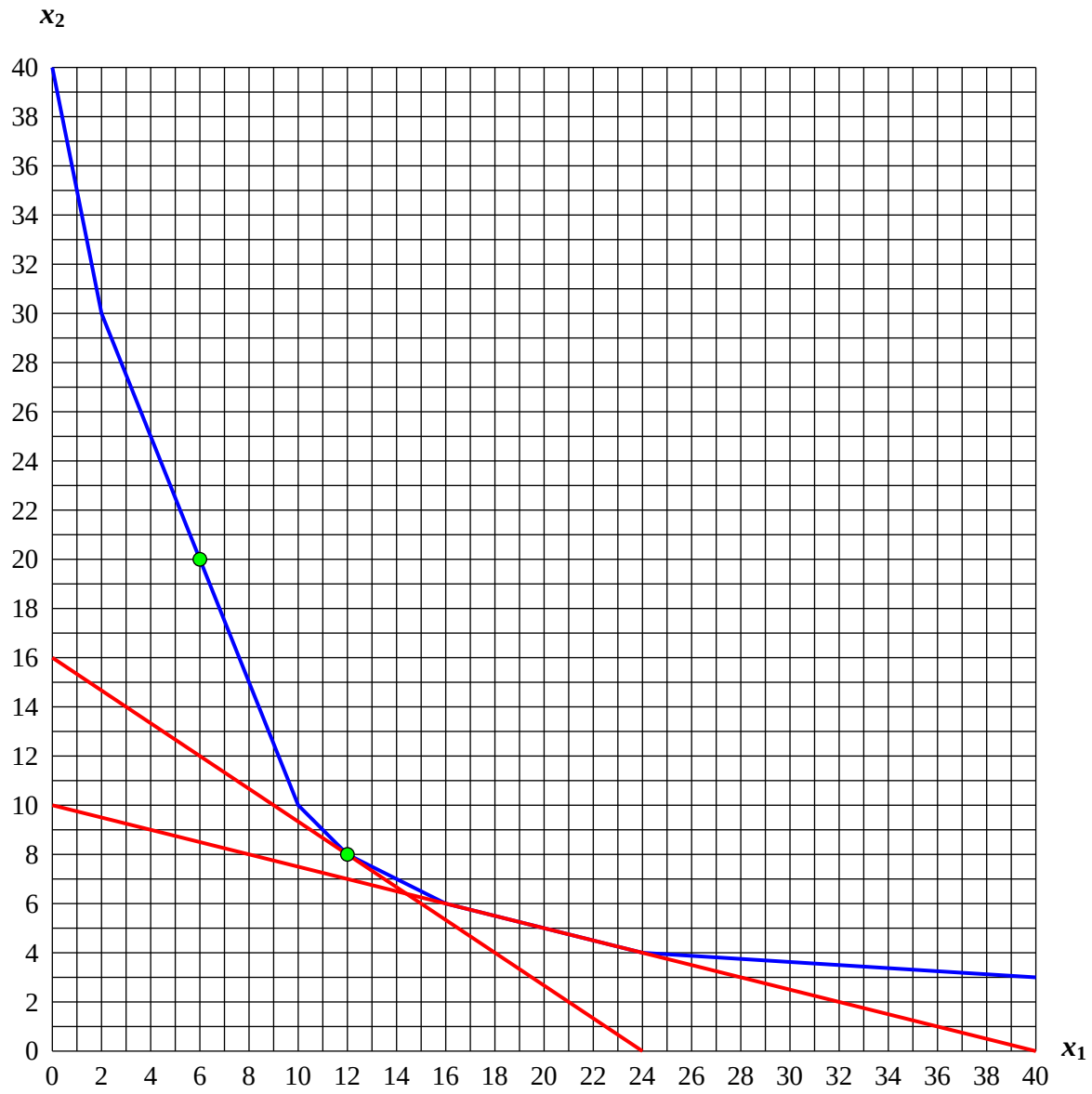
*15 points*




**Question 7**

**(a)** The least costly consumption bundle that gives the same utility as $(6, 20)$ at price $p_1 = 2$, $p_2 = 3$ is $\boxed{x_1 = 12, x_2 = 8}$ *5 points*

**(b)** At prices $p_1 = 1$, $p_2 = 4$ how much money does the person need to get the same utility ase $(6, 20)$ $\boxed{I = 40}$ *5 points*




**Question 8** In equilibrium $100 - 2P = 10 + P$, i.e., $P = 30$.

If the government pays a subsidy of 6 Dollars per unit produced to suppliers, then supply is $Q_S(P + 6) = 10 + (P + 6) = 16 + P$. Thus, $16 + P = 100 - 2P$, i.e., $P = 28$

**The equilibrium price before the subsidy is $P = 30$**

**The equilibrium price after the subsidy is $P = 28$**

Firms supply 16 + 28 = 44 units. Thus,

**The government's total subsidy payment is 264**

*10 points*