

Name:

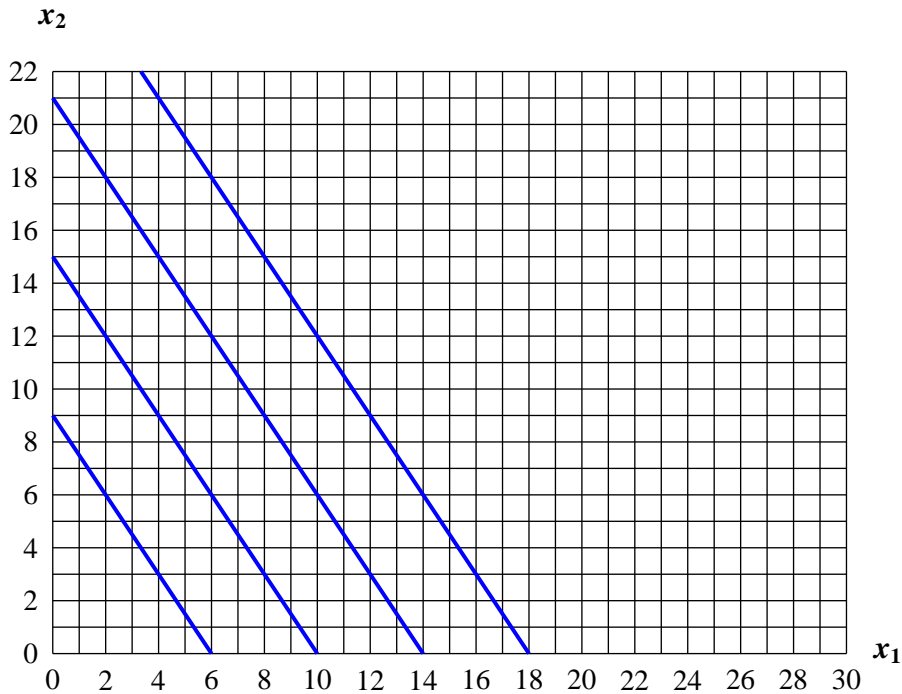
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**All questions must be answered on this test form!**

For each question you must show your work and (or) provide a clear argument.

All graphs must be accurate to get credit.

**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  $x_1 =$  ,  $x_2 =$  . 5 points
2. Suppose that  $(8, 9)$  is the optimal consumption and that  $p_1 = 6$ . Then  $p_2 =$  ,  $I =$  . 5 points
3. Suppose that  $(10, 0)$  is the optimal consumption and that  $p_1 = 60$ . Then  $p_2 \leq = \geq$   (Circle the correct sign and fill in the correct number). 5 points

**Question 2** A demand function is given by  $Q_D(P) = 300 - 3P$ . Then the price elasticity of demand is given by

$$\epsilon_D^P =$$

5 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,

$$\text{Revenue is maximized at price } P =$$

5 points

At this price, demand is  $Q =$  and revenue is

**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

$Q_D(P) =$

*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.

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

- (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)  $x_2 \geq 0$ .

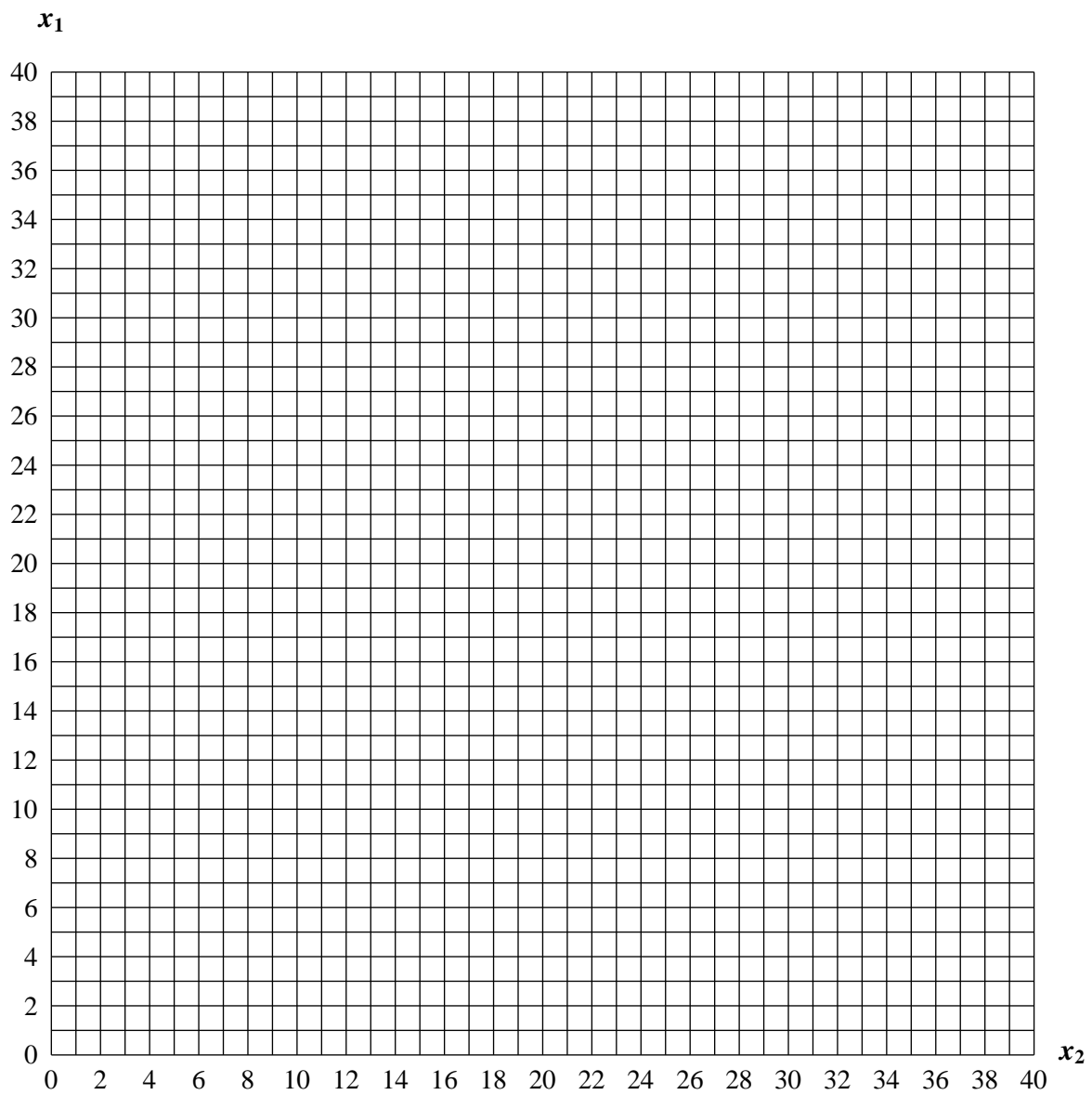
Determine the optimum graphically. *Indicate the feasible set by shading it!*

15 points

<b>At an optimum <math>x_1 =</math></b>	<b><math>x_2 =</math></b>
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<b>The maximum revenue is</b>	<b>.</b>
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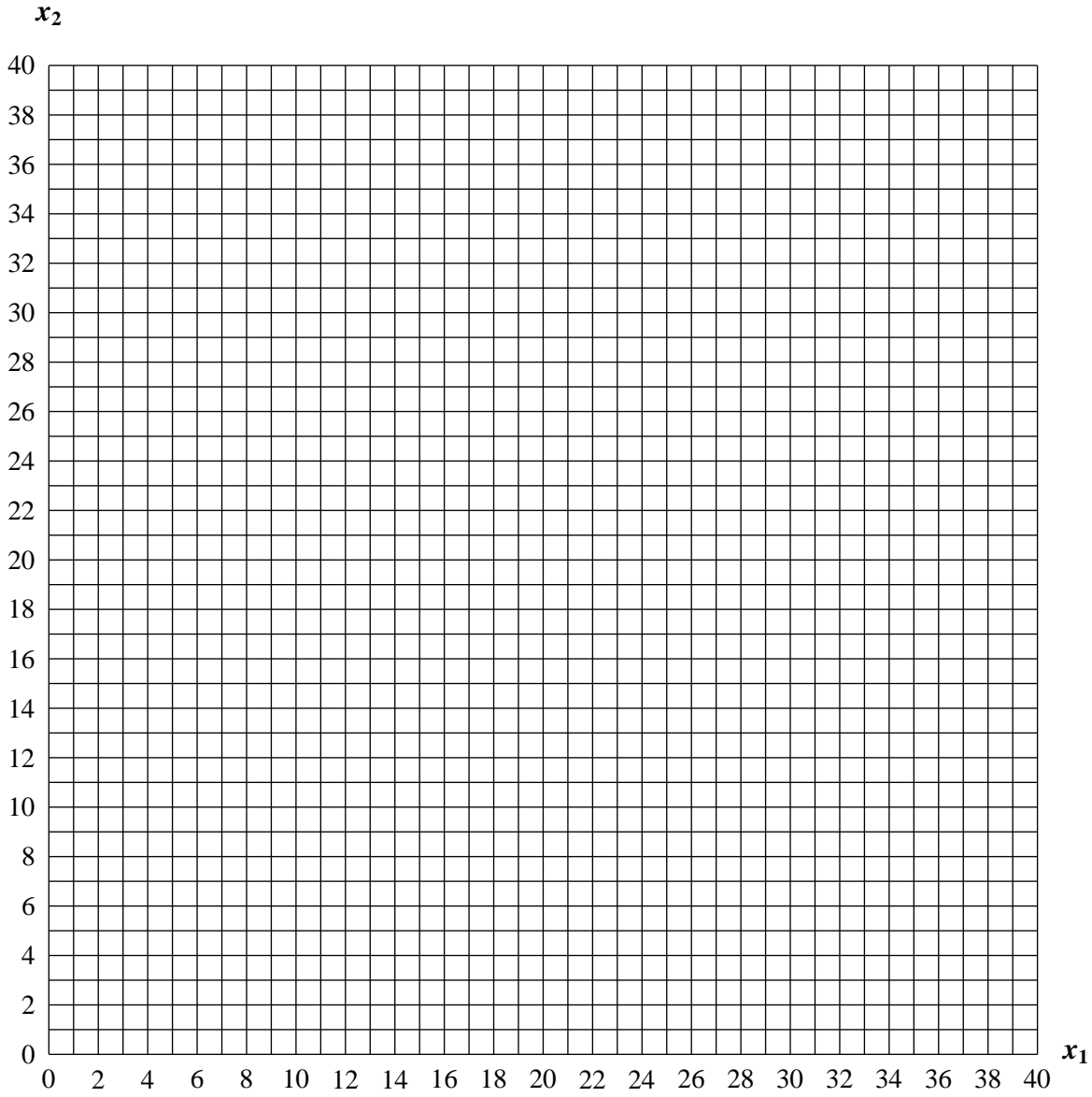
*Use the grid on the following page*



**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.

<b>At the optimal choice, <math>x_1 =</math></b>	<b><math>x_2 =</math></b>
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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

$x_1 =$	$x_2 =$
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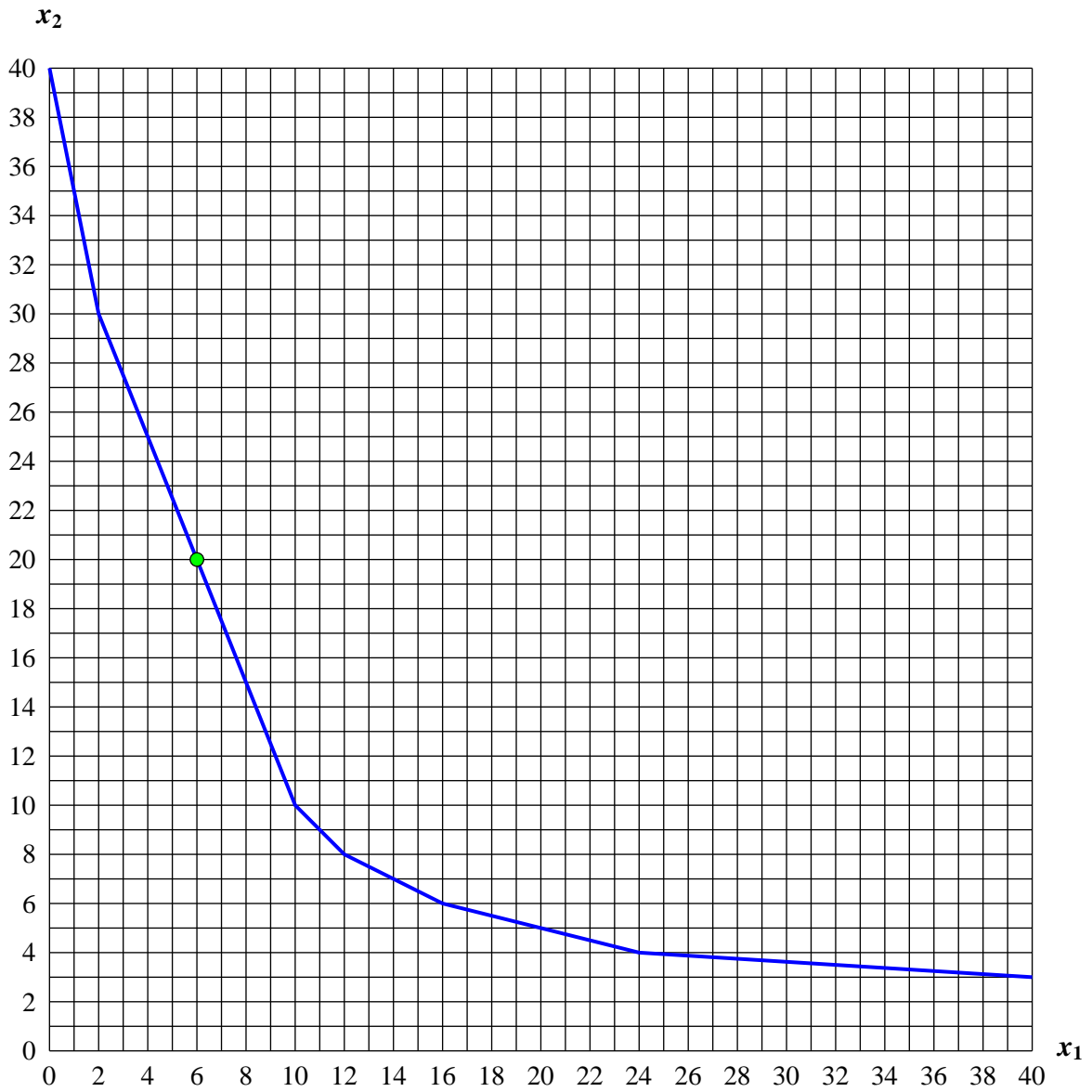
5 points

(b) At prices  $p_1 = 2, p_2 = 8$  how much money does the person need to get the

same utility ase (6, 20)

$I =$
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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*