**2.*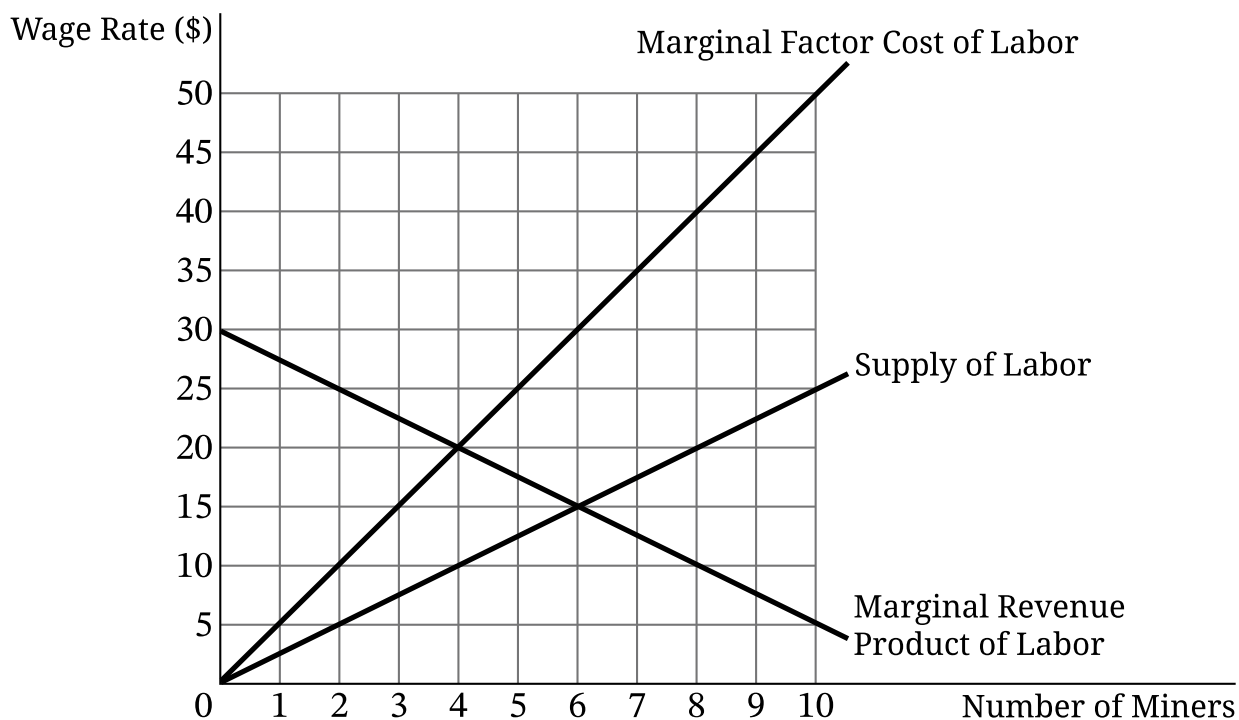* Quartz Excavations is a profit-maximizing firm and the only employer of miners of quartz in a small town. The graph provided shows the labor market for miners.



**A.** Identify Quartz Excavations' profit-maximizing number of miners to hire.

**B.** Will Quartz Excavations pay its profit-maximizing number of miners a wage rate that is equal to $15, greater than $15, or less than $15? Explain using numbers.

**C.** Suppose the government sets a minimum wage (a price floor on wages) at $25. Calculate the total wage bill for Quartz Excavations at the resulting profit-maximizing number of miners. Show your work.

**D.** Suppose that instead of a minimum wage, there is now an increase in the demand for quartz.

　i. Will the marginal revenue product of miners increase, decrease, or remain the same? Explain.

　ii. After the demand for quartz increases, Quartz Excavations hires the new profit-maximizing number of miners. Will the marginal factor cost of the last miner hired be greater than, less than, or equal to the marginal factor cost of the last miner hired before the demand for quartz increased?

**3.** The table provided shows the marginal utility for Lucy when she consumes Good X and Good Y.

| Quantity of Good X | Marginal Utility of Good X (utils) | Quantity of Good Y | Marginal Utility of Good Y (utils) |
|---|---|---|---|
| 1 | 20 | 1 | 28 |
| 2 | 16 | 2 | 24 |
| 3 | 12 | 3 | 16 |
| 4 | 8 | 4 | 8 |
| 5 | 4 | 5 | −4 |
| 6 | −2 | 6 | −8 |

**A.** If Good X and Good Y are free, how many units of each good will maximize Lucy's total utility?

**B.** Calculate Lucy's total utility if she consumes 2 units of Good X and 2 units of Good Y. Show your work.

**C.** Suppose instead that the price of each unit of Good X is $2 and the price of each unit of Good Y is $4. Lucy has a budget of $20 to spend on the two goods.

   i. If Lucy purchases 2 units of Good X, what is the maximum quantity of Good Y Lucy can purchase?

   ii. What is Lucy's optimal combination of Good X and Good Y? Explain your answer using marginal analysis and numbers.

**D.** Suppose the price elasticity of demand for Good X is $-2.0$, the price elasticity of demand for Good Y is $-0.8$, and the cross-price elasticity of demand between Good X and Good Y is $+1.6$. Are goods X and Y complementary goods, substitute goods, normal goods, or inferior goods? Explain.

**STOP**

**END OF EXAM**

## Question 2: Short                                                    5 points

| | | | |
|---|---|---|---|
| **A**<br><br>Point 1 | | State that the profit-maximizing number of miners is 4. | **1 point** |
| **B**<br><br>Point 2 | | State that Quartz Excavations will pay a wage rate that is less than $15 and explain that the wage rate paid by a monopsonist is determined by the supply of labor at the quantity of labor hired. Thus, the wage rate associated with the hiring of 4 miners is $10. | **1 point** |
| **C**<br><br>Point 3 | | Calculate the total wage bill as $50 and show your work.<br><br>Total Wage Bill $= \$25 \times 2 = \$50$ | **1 point** |
| **D**<br><br>Point 4 | **(i)** | State that the marginal revenue product of miners will increase and explain that the increase in demand for quartz will increase the price and marginal revenue of quartz. | **1 point** |
| | **(ii)**<br><br>Point 5 | State that the marginal factor cost of the last miner hired will be greater than the marginal factor cost of the last miner hired before the increase in the demand for quartz. | **1 point** |