**Solution 6**

**I/ Problems**

**Problem 1**

Suppose that mugs can be produced using 2 technologies of production, A and B. The following table provides the total input requirements for each of 5 different total output levels:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Q =1** | **Q =2** | **Q = 3** | **Q = 4** | **Q = 5** |
| Tech. | K | L | K | L | K | L | K | L | K | L |
| A | 2 | 5 | 1 | 10 | 5 | 14 | 6 | 18 | 8 | 20 |
| B | 5 | 2 | 8 | 3 | 11 | 4 | 14 | 5 | 16 | 6 |

1. Assuming that the price of L (PL) is $1 and the price of K (PK) is $2, calculate the total cost of production for each of the 5 levels of output using the optimal technology at each level
2. How many units of L would be employed at each level of output? How many units of K?
3. Total costs of each technique are as follows:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
| Tech A |  $9 | $12 | $24 | $30 | $36 |
| Tech B | $12 | $19 | $26 | $33 | $38 |

 Technique A is cheaper at all levels of output.

1. Since technology A is cheaper at all levels of output 🡺 the levels of L and K that will be used at each level of output are that of technology A

**Problem 2**

You can make identical sweaters in 2 ways: the first technique (i) uses a machine that can be rented for $50/hour and a person to run the machine who can be hired for $25/hour. Via this technique, 5 sweaters can be produced in an hour using $10 worth of wool. The second technique (ii) uses the same machine but a less skilled worker who can produce 4 sweaters per hour with the same $10 worth of wool.

At what wage rate (of the worker used in the second technique) you would be indifferent between the two techniques?

I would be indifferent between the two techniques if the cost of producing one sweater is the same regardless of the technique used. Let us thus compute the cost of producing 1 sweater using the first technique: the skilled labor technique produces a sweater at a cost of ($50 + $25 + $10)/5 = $17. To be indifferent between the two techniques 🡺 the per-sweater cost of the second technique should be equal to $17 🡺 ($50 + $10 + Wage)/4 = $17 🡺 $60 + W = $68 🡺 W = $8/hour.

**Problem 3**

The Cape Verdean diva, Cesaria Evora, is considering stopping live performances and investing in a restaurant. Help here making her decision (should she invest in the restaurant?) based on the following information:

* The needed capital is estimated at $180 000
* The expected annual sales amount to $230 000
* The explicit annual costs are estimated at $120 000
* The interest paid by the Cape Verdean government on treasury bills is 3%
* Evora’s annual gains from live performances are estimated at $100 000

To help Cesaria Evora make the right decision, we need to compute the expected economic profit of the restaurant. The economic profit is the difference between the expected revenues and the expected total costs.

The expected revenues are equal to $230 000. The expected total costs include the expected explicit costs and the implicit costs (i.e. the opportunity costs of the inputs used). The explicit costs are estimated at $120 000. There are two implicit costs to consider: first, the opportunity cost of the capital invested: 3% × $180 000 = $5 400. The second implicit cost is what the diva used to earn annually from her concerts ($100 000): she has to give up this amount in order to open the restaurant. All in all, the implicit costs amount to: $100 000 + $5 400 = $105 400. Total costs are thus equal to $120 000 (explicit costs) + $105 400 (implicit costs) = $225 400.

Thus, the expected annual economic profit is $230 000 – $225 400 = $4 600.

She would earn a positive economic profit: the expected annual rate of return of the restaurant exceeds the normal rate of return. She can definitely invest in the restaurant!

**Problem 4** *(the 1 million dollar question!)*

“Speed dating” has been gaining popularity in recent years. Singles assemble to meet each other over short time periods (3 to 8 minutes) in a club, taking information notes that they use afterwards to examine which participants to “follow up” after the event. Can you explain the popularity of speed dating using the concept of diminishing returns (as opposed to a “normal” first date)?

We can (safely) assume that what a single person is looking for in a first date is to “collect”, as much as possible, valuable information (about the partner) within a given period of time. Usually in a (normal) first date, after a certain period of time, the valuable information that can be extracted is exhausted (you surely know the abyssal silence that can set in!) 🡺 after a certain moment, the information-value of each additional minute spent with the partner decreases 🡸🡺 the marginal return of each additional minute spent decreases. Since in a speed dating the encounter does not last much; a single person can collect valuable information about the partner without experiencing diminishing returns.

**II/ Multiple choice questions**

1. Sami increases the amount of capital his workers use. The average product of labor will            and the marginal product of labor will            .

(**a**) increase; increase

(b) decrease; decrease

(c) increase; decrease

(d) decrease; increase

Additional capital will increase the MP of the labor 🡺 TP (the sum of MP) will thus increase 🡺 AP (TP/L) will in turn increase

2. The specific mix of inputs and technology chosen by a firm depends on

(a) the demand for the product.

(b) the supply of the product.

(c) the price of the product.

(**d**) the prices of inputs.