Youngberg

Econ 301—Bethany College

**Homework 05**

Answer all the following on a ***typed, stapled*** (if applicable)separate sheet of paper. You do not need to type equations and graphs. I charge 25 cents to staple your homework. Make sure that you justify your answers, use your own words, and show your work. All questions are equally weighted.

1. Calculate the average and marginal products using the table below. Then determine how many units of labor to hire if the price of labor is $4.

|  |  |  |  |
| --- | --- | --- | --- |
| *Total Labor* | *Total Product* | *Marginal Product* | *Average Product* |
| 0 | 0 |  |  |
| 1 | $8 | $8 | $8 |
| 2 | $18 | $10 | $9 |
| 3 | $24 | $6 | $8 |
| 4 | $28 | $4 | $7 |
| 5 | $30 | $2 | $6 |
| 6 | $24 | -$6 | $4 |
| 7 | $14 | -$10 | $2 |

*You hire four units of labor, where MC=MPL and APL > MC.*

1. Why are isocost lines straight lines?

*The isocost line has a slope equal to the ratio of the prices of capital and labor. Since these prices do not change based on how much you’ve purchased (unlike how the MRTS changes based on how much you’re using), the slope is constant, thus the line is straight.*

1. Use the following table to fill in the rental rate and the user cost of capital.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Cost of Capital* | *Life Span*  *(yrs)* | *Interest Rate*  *(annual)* | *User Cost of Capital after 2 years* | *User Cost of Capital after 4 years* | *r/$* |
| $30,000 | 10 | 5% | *$4,200* | *$3,900* | *0.15* |
| $50,000 | 20 | 3% | *$3,850* | *$3,700* | *0.08* |
| $10,000 | 5 | 4% | *$2,240* | *$2,080* | *0.24* |
| $100,000 | 25 | 10% | *$13,200* | *$12,400* | *0.14* |

*$3,000 + 0.05\*$24,000 = $4,200*

*$3,000 + 0.05\*$18,000 = $3,900*

*0.10 + 0.05 = 0.15*

*$2,500 + 0.03\*$45,000 = $3,850*

*$2,500 + 0.03\*$40,000 = $3,700*

*0.05 + 0.03 = 0.08*

*$2,000 + 0.04\*$6,000 = $2,240*

*$2,000 + 0.04\*$2,000 = $2,080*

*0.20 + 0.04 = 0.24*

*$4,000 + 0.10\*$92,000 = $13,200*

*$4,000 + 0.10\*$84,000 = $12,400*

*0.04 + 0.10 = 0.14*

|  |  |  |
| --- | --- | --- |
| *MRTS* | *Change in Labor* | *Change in Capital* |
| 4 | -0.5 | *2* |
| 6 | *-0.5* | 3 |
| *0.75* | 4 | -3 |
| 0.90 | *-1.11* | 1 |

1. Using the information to the right, determine the marginal rate of technical substitution, the change in capital, or the change in labor.

*-(4 / -0.5) = 2*

*-(3 / 6) = -0.5*

*-(-3/4) = 0.75*

*-(1/0.9) = -1.11*

1. Construct three different isoquants, each with its own isocost line (assuming constant prices of capital and labor) to determine optimal bundles. Then, construct an expansion path using those three different optimal bundles.

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K

**C**

**B**

**A**

**Q3**

**Q2**

**Q1**

**C3**

**C2**

**C1**

**Expansion Path**