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**TCET 4140 Telecommunication Network Management**

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**Project 3**

1. The cost of building a network is related to the total length of the transmission line. Assume hypothetically that the costs to build similar networks by the same K companies, are shown in the accompanying table.

Network Feet (ft) Cost ($)

1 14,500 800,000

2 15,000 825,000

3 17,000 875,000

4 18,500 972,000

5 20,400 1,074,000

6 21,000 1,250,000

7 25,000 1,307,000

8 26,750 1,534,000

9 28,000 1,475,500

10 30,000 1,525,000

**a.** Develop a CER for the construction of networks. Use the CER to estimate the cost of K’s next network, which has a planned a length of 2300m. (3.4)

**b.** Compute the standard error and correlation coefficient for the CER developed in Part (a). (3.4)

2. You are the manager of a large network. Lets assume that, as part of the network, certain servers fans must be replaced every year. The replacement and downtime cost in the first year is $1000. The cost is expected to increase due to the inflation rate of 8% per year for 5 years, at which time this particular fans will no longer be needed (servers are replaced with new ones). If the company’s cost of capital is 18% per year, how much could you afford to spend for higher quality fans so that these replacements and downtime costs would be eliminated?

a)

|  |  |  |
| --- | --- | --- |
| **Network**  | **Feet (ft)**  | **Cost ($)** |
| 1 | 14500 | 800000 |
| 2 | 15000 | 825000 |
| 3 | 17000 | 875000 |
| 4 | 18500 | 972000 |
| 5 | 20400 | 1074000 |
| 6 | 21000 | 1250000 |
| 7 | 25000 | 1307000 |
| 8 | 26750 | 1534000 |
| 9 | 28000 | 1475500 |
| 10 | 30000 | 1525000 |
| **Cost-Capacity Factor** |
| **Reflecting Economies** |
| **of Scale:** |
|  $ 0.71  |

|  |  |  |
| --- | --- | --- |
| Average Network Length: | 21615 |  |
| Average Network Cost: |  $ 1,163,750.00  |  |
|  |  |  |
| Cost estimate for a 2300 meter network: |  |
| 2300 meters =  | 7545.93 | feet |
| CB= (SB/SA)^0.7146 |  $ 501,632.50  |  |
|  |  |  |

b) Standard error calculation



|  |  |  |
| --- | --- | --- |
| Standart Error = |  $ 802,465.75  |  |
| Corelation Coefficient |  |  |
| Corelation Coeficient= | 0.976496 |  |
| (Xi-X¯) | (Yi-Y¯) | (Xi-X¯)\*(Yi-Y¯) | (Xi-X¯)^2 | (Yi-Y¯)^2 |
| -7115 | -363750 | 2588081250 | 50623225 | 1.32314E+11 |
| -6615 | -338750 | 2240831250 | 43758225 | 1.14752E+11 |
| -4615 | -288750 | 1332581250 | 21298225 | 83376562500 |
| -3115 | -191750 | 597301250 | 9703225 | 36768062500 |
| -1215 | -89750 | 109046250 | 1476225 | 8055062500 |
| -615 | 86250 | -53043750 | 378225 | 7439062500 |
| 3385 | 143250 | 484901250 | 11458225 | 20520562500 |
| 5135 | 370250 | 1901233750 | 26368225 | 1.37085E+11 |
| 6385 | 311750 | 1990523750 | 40768225 | 97188062500 |
| 8385 | 361250 | 3029081250 | 70308225 | 1.30502E+11 |
|  |  | 14220537500 | 276140250 | 7.68E+11 |