Ch. 1: 1

*With respect to the selection of alternatives, state one thing that engineering economy will help you to do and one thing that it will not.*

Engineering economy will help me decide what the most economically viable investment is. It will not help me decide how different investments will interact with each other.

6

*What is meant by the term* ***intangible factors****?*

Intangible factors are non-economic, and can be hard to quantify. Some examples are: goodwill, convenience, friendship and morale.

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*When an interest rate, such as 3%, does not include the time period, the time period is assumed to be what?*

1 year.

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*How many years would it take for an investment of $280,000 to accumulate to at least $425,000 at 15% per year interest?*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | current value |  | amount earned |  |
| **0** | 280,000.00 | =A3\*(1.15) | -- | -- |
| **1** | 322,000.00 | =A4\*(1.15) | $42,000.00 | =A3\*(0.15) |
| **2** | 370,300.00 | =A5\*(1.15) | $48,300.00 | =A4\*(0.15) |
| **3** | **425,845.00** | **=A6\*(1.15)** | $55,545.00 | =A5\*(0.15) |

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*A company that manufactures general-purpose transducers invested $2 million 4 years ago in high-yield junk bonds. If the bonds are now worth $2.8 million, what rate of return per year did the company make on the basis of (a) simple interest and (b) compound interest?*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Simple Interest** | |  | **Compound Interest** | |  |
| Year | Value | Formula | Year | Value | Formula |
| 0 | $2,000,000 | -- | 0 | $2,000,000 | -- |
| 1 | -- | -- | 1 | $2,175,400 | =E2\*(1+$E$8) |
| 2 | -- | -- | 2 | $2,366,183 | =E3\*(1+$E$8) |
| 3 | -- | -- | 3 | $2,573,697 | =E4\*(1+$E$8) |
| 4 | $2,800,000 | -- | 4 | $2,799,410 | =E5\*(1+$E$8) |
|  |  |  |  |  |  |
| Rate | 0.1 | =(2.8 / 2 -1)/ 4 |  | 0.0877 |  |

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*Vision Technologies, Inc. is a small company that uses ultra-wideband technology to develop devices that can detect objects (including people) inside buildings, behind walls, or below ground. The company expects to spend $100,000 per year for labor and $125,000 per year for supplies before a product can be marketed. If the company wants to know the total equivalent future amount of the company’s expenses at the end of 3 years at 15% per year interest, identify the engineering economy symbols involved and the values of the ones that are given.*

|  |  |
| --- | --- |
| P | -- |
| F | ? |
| A | ($225,000) |
| i | 15% |
| n | 3 |
| $781,312.50 | =FV(B4,B5,B3) |

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*Construct a cash flow diagram for the following: $10,000 outflow at time zero, $3000 per year inflow in years 1 through 5 at an interest rate of 10% per year, and an unknown future amount in year 5.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Cash Flow** | **Formula** | **Value** | **Formula** |
| 0 | -$10,000.00 | -10000 |  |  |
| 1 | $3,000.00 | 3000 |  |  |
| 2 | $3,300.00 | =B3\*1.1 |  |  |
| 3 | $3,630.00 | =B4\*1.1 |  |  |
| 4 | $3,993.00 | =B5\*1.1 |  |  |
| 5 | $4,392.30 | =B6\*1.1 | ($34,420.40) | =FV(0.1,5,3000,10000) |

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*What are the values of the engineering economy symbols P, F, A, I, and n, in the following Excel functions? Use a “?” for the symbol that is to be determined.*

1. FV(8%,10,2000,10000)

Rate = i = 8%

Nper = n = 10

Pmt = A = 2000

Pv = P = 10000

1. PMT(12%,30,16000)

Rate = i = 12%

Nper = n = 30

Pv = P = 16000

1. PV(9%,15,1000,700)

Rate = i = 9%

Nper = n = 15

Pmt = A = 1000

Fv = F = 700