Ch. 6: 1, 2, 13, 14, 19, 23, 25, 31

1. What is the lowest rate of return (in percent) that is possible? -100% (All money lost)
2. What is the nominal rate of return per year on an investment that doubles in value every 6 months?
3. Rubber sidewalk: $60,000 – 9 year lifetime

Concrete Sidewalk: $28,000 – 3 year lifetime

Rate of return = ?

0 = -PW(r) + PW(c)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Rubber | Concrete | Diff |  |  |
| 0 | -60000 | -28000 | -32000 | 14% | =IRR(D2:D8) |
| 1 | 0 | 0 | 0 |  |  |
| 2 | 0 | 0 | 0 |  |  |
| 3 | 0 | -28000 | 28000 |  |  |
| 4 | 0 | 0 | 0 |  |  |
| 5 | 0 | 0 | 0 |  |  |
| 6 | 0 | -28000 | 28000 |  |  |

1. Very light jets (VLJs) are smaller aircraft that may revolutionize the way people travel by plane. They cost between $ 1.5 and $3 million, seat 5 to 7 people, and can fly over 1000 miles at speeds approaching 460 mph. Eclipse Aviation was founded in 1998 and its sale business is making VLJs. The company invested $500 million (at time 0) and began taking orders 2 years later. If the company accepted orders for 2500 planes and received *10%* down (in year 2) on planes having an average cost of $1.8 million, what rate of return will the company make over a 10-year planning period? Assume 500 of the planes are delivered each year in years 6 through 10 and that the company's manufacturing and M&O costs average $ 10 million per year in years 1 through 10.

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Cost |  |  |
| 0 | -500000000 | 42% | =IRR(B11:B21) |
| 1 | -10000000 |  |  |
| 2 | 440000000 |  |  |
| 3 | -10000000 |  |  |
| 4 | -10000000 |  |  |
| 5 | -10000000 |  |  |
| 6 | 890000000 |  |  |
| 7 | 890000000 |  |  |
| 8 | 890000000 |  |  |
| 9 | 890000000 |  |  |
| 10 | 890000000 |  |  |

1. In selecting between two mutually exclusive alternatives, under what circumstance will the one with the higher rate of return *1101* necessarily represent the better investment?
2. For the cash flows shown, what is the incremental cash flow between machines B and A *'(0)* in year 0, *(b)* in year 3, and *(c)* in year 6?

|  |  |  |
| --- | --- | --- |
|  | Alternative X | Alternative Y |
| First cost, $ | -15000 | -25000 |
| Annual operating cost | -1600 | -400 |
| Salvage value, $ | 3000 | 6000 |
| Life, years | 5 | 5 |

|  |  |  |  |
| --- | --- | --- | --- |
| Year | X | Y | Diff |
| 0 | -15000 | -25000 | 10000 |
| 1 | -1600 | -400 | -1200 |
| 2 | -1600 | -400 | -1200 |
| 3 | -1600 | -400 | -1200 |
| 4 | -1600 | -400 | -1200 |
| 5 | 1400 | 5600 | -4200 |

1. For the alternatives shown, determine the sum of the incremental cash flows for Alternative B -Alternative A.

|  |  |  |
| --- | --- | --- |
|  | Alternative A | Alternative B |
| First cost, $ | -50000 | -85000 |
| Annual operating cost | -8600 | -2000 |
| Annual revenue | 22000 | 45000 |
| Salvage Value | 3000 | 8000 |
| Life, years | 3 | 6 |

|  |  |  |  |
| --- | --- | --- | --- |
| Year | A | B | Sum |
| 0 | -50000 | -85000 | -135000 |
| 1 | 13400 | 43000 | 56400 |
| 2 | 13400 | 43000 | 56400 |
| 3 | -33600 | 43000 | 9400 |
| 4 | 13400 | 43000 | 56400 |
| 5 | 13400 | 43000 | 56400 |
| 6 | 13400 | 51000 | 64400 |

1. An industrial engineer working for American Manufactured Products was asked to make a recommendation about which of four mutually exclusive *cost* alternatives should be selected for improving a certain materials handling operation. The alternatives (identified as A, B, C, and D) were ranked in order of increasing initial investment and then compared by incremental rate of return analysis. The rate of return on each increment of investment was less than the company's MARR of 32% per year. Which alternative should be selected?