6-3

$60

$45

$30

$15

E E E E

EUAC = $60 − $15 (*A*/*G*, 12%, 4)

= $60 − $15 (1.359)

= $39.62

6-5

$100

A A A

A = $1,000 (*A*/*P*, 3.5%, 3)

= $1,000 (0.3569)

= $356.90

6-7

…..

…...

*n* = 480

A

*n* = 20

A

F = $1,000,000

Again we have the problem that 500 time periods is beyond the reach of our tables. So we split it into 20 time periods, starting in the present, and an additional 480 time periods, starting after the first 20 have been completed.

*F* = *A* (*F*/*A*, 1.25%, 480) (*F*/*P*, 1.25%, 20) + *A* (*F*/*A*, 1.25%, 20)

= *A* [(31,017) (1.282) + 22.6]

= *A* (39,786)

*A* = $1,000,000/39,786

= $25.13

6-21

*i* = 10%

|  |  |
| --- | --- |
| **Year** | **Amount** |
| 1 | 600 |
| 2 | 700 |
| 3 | 800 |
| 4 | 900 |
| 5 | 1000 |
| 6 | 900 |
| 7 | 800 |
| 8 | 700 |
| 9 | 600 |
| 10 | 500 |

The net present value of these flows from Years 1 to 10 = NPV (RATE, RANGE) = $4,652.99

This value *P* can be converted to an equivalent uniform *A* by multiplying by (*A*/*P*, 10%, 10) = 0.1627

Thus, equivalent annual *A* = $757.04

6-31

………….

n = ∞

$100

$200

$300

$200

$100

$200

$300

$200

A

Pattern repeats infinitely

There is a repeating series: 100 − 200 − 300 − 200. Solving this series for *A* gives us the *A* for the infinite series.

*A* = $100 + [$100 (*P*/*F*, 10%, 2) + $200 (*P*/*F*, 10%, 3) + $100 (*P*/*F*, 10%, 4)] (*A*/*P*, 10%, 4)

= $100 + [$100 (0.8254) + $200 (0.7513) + $100 (0.6830)] (0.3155)

= $100 + [$301.20] (0.3155)

= $195.03

6-36

**Original Loan**

Annual Payment = $280,000 (*A*/*P*, 10%, 25) = $280,000(0.1102) = $30,856

Balance due at end of 10 years:

Method 1: Balance = $30,856 (*P*/*A*, 10%, 15) = $30,856(7.606)= $234,691

Method 2: The payments would repay: = $30,856 (*P*/*A*, 10%, 10) = $30,856(6.145) = $189,610 making the unpaid loan at Year 0:

= $280,000 – $189,610= $90,390

At year 10 this becomes:

= $90,390 (*F*/*P*, 10%, 10) = $90,390(2.594) = $234,471

Note: The difference is due to four-place accuracy in the compound interest tables.

**New Loan**

(Using $234,691 as the existing loan)

Amount owed = $234,691+ 2% ($234,691) + $1,000 = $240,384

New Annual Pmt. = $240,384 (*A*/*P*, 9%, 15) = $240,384 (0.1241) = $29,832

New payment < Old payment, therefore refinancing is desirable.

6-47

**Machine A**

EUAC = $1,000 + Pi

= $1,000 + $10,000 (*A*/*P*, 10%, 4) − $10,000 (*A*/*F*, 10%, 4)

= $1,000 + $1,000

= $2,000

**Machine B**

EUAC = ($20,000 − $10,000) (*A*/*P*, 10%, 10) + $10,000 (0.10)

= $1,627 + $1,000

= $2,627

Choose Machine A.

6-53

**Machine A**

Annual excess of benefits over costs = −$700,000 (*A*/*P*, 15%, 10) − $18,000 + $154,000 − $900 (*A*/*G*, 15%, 10) + $142,000 (*A*/*F*, 15%, 10)

= −$139,500 − $18,000 + $154,000 − $3,045 + $7,000

= $446

**Machine B**

Annual excess of benefits over costs = −$1,700,000 (*A*/*P*, 15%, 20) − $29,000 + $303,000 − $750 (*A*/*F*, 15%, 20) + $210,000 (*A*/*F*, 15%, 20)

= −$271,660 − $29,000 + $303,000 − $4,024 + $2,050

= $366

Thus, the choice is Machine A but note that there is very little difference between the alternatives.

6-76

Assuming monthly compounding, using *i* = 1.25%/month

(a) Initial Costs = $4.8M + $3.2M = $8.0M

Selling Price (yr 35) = $4.8M (0.10) + $3.2M = $3.68M

Annual Expenses = $0.85M + $8 (0.06) = $1.33M

C = Monthly Leasing Cost

NPW = 0 = C (0.88)(*P*/*A*, 1.25%, 420) + $3.68M (*P/F*, 1.25%, 420) – $8M – ($1.33/12) (*P*/*A*, 1.25%, 420)

NPW = 0 = C (0.88)(79.5663) + $3.68M (0.005421) – $8M – ($1.33/12) (79.5663)

C = $16.79865M / (0.88 × 79.5663) = $239,918

(b) Decreasing the vacancy rate by 5% to 7% yields a monthly rent of:

Monthly rent = $16.79865M / (0.93 × 79.5663) = $227,019

This would amount to an increase in monthly profit of $12,899. Sounds like a good idea.