**Homework Week 3**

**EGR 310**

**(10 pts each problem)**

1. Compute the internal rate of return (IRR) for the following cash flows: (Chapter 7)

|  |  |
| --- | --- |
| Year | Alt A |
| 0 | $30,000 |
| 1 | -$8,071 |
| 2 | -$8,071 |
| 3 | -$8,071 |
| 4 | -$8,071 |

8071(P/A, i, 4) =\_\_\_\_\_\_\_\_\_

(P/A, i, 4) = 30000/8071 = \_\_\_\_\_\_\_\_

From Appendix C, (P/A, 3%, 4) = \_\_\_\_\_\_\_

i = \_\_\_\_\_\_\_

1. A 20 year bond with a face value of $1,000 has an 8% coupon rate compounded quarterly. If the bond was purchased for $1,107 and held to maturity, what is the IRR of the bond? (Chapter 7)

Number of periods = 4 quarters \* 20 years =\_\_\_\_\_\_\_

Interest Payment per quarter = $1,000\*((.08)/4) =\_\_\_\_\_\_\_

20\*(P/A, i, 80) + 1000(P/F, i, 80)=\_\_\_\_\_\_\_

Try 2%

20\*(39.744) + 1,000(.2051) =\_\_\_\_\_\_\_\_

Try 1.75%

20\*(42.880) + 1,000(.2496) = \_\_\_\_\_\_\_\_

i = 1.75 /quarter

IRR = ((1 + .0175)^4) -1 =\_\_\_\_\_\_\_

1. A $1,000 face value 10 year bond returns $50 semiannually. If the bond was purchased when issued for $1,011, and then sold after 6 years for $1,020, what ,was the IRR the purchaser received? (Chapter 7)

Number of periods = 2 \* 6 years =\_\_\_\_\_\_\_\_\_

50\*(P/A, i, 12) + 1020\*(P/F, i, 12)=\_\_\_\_\_\_\_\_

Try 4.5%

50\*(9.119) + 1020\*(.5897)=\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Try 5%

50\*(8.863) + 1020\*(.5568) =\_\_\_\_\_\_\_\_\_\_\_\_\_

IRR = ((1.05))^2 – 1 =\_\_\_\_\_\_\_\_\_\_\_

1. A car dealer gives you 2 options to buy a $50,000 new car.

Option 1 is no money down, but pay back in equal monthly installments for 5 years at 0% interest.

The second option is to pay cash for the car and get a $6,895 rebate.

What is the IRR of the payment option? (Chapter 7)

Monthly payment = $50,000/60 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Purchase price = $50,000 –$ 6895 =\_\_\_\_\_\_\_\_\_\_\_\_\_

Find monthly i

833.33\*(P/A, i, 60)=\_\_\_\_\_\_\_\_\_\_\_

(P/A, i, 60) =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

i = 0.5% monthly

IRR = ((1.005)^12) – 1 = \_\_\_\_\_\_\_\_\_\_\_\_\_

1. Use incremental analysis to evaluate the 2 alternatives. Assume a seven year life and a MARR of 15%. (IRRs for each is given) Would picking the highest IRR give you the best investment decision? (Chapter 7)

|  |  |  |
| --- | --- | --- |
|  | **Alt A** | **Alt B** |
| **Initial Investment** | $21,000 | $16,000 |
| **O&M Costs** | $2000 | $3,000 |
| **Annual Benefit** | $8,000 | $7,500 |
| **Salvage Value** | $5,000 | $8,000 |
| **IRR** | 23.2% | 24.8% |

Solution

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Alt A** | **Alt B** | **A-B** | **B-A** |
| **Initial Investment** | $21,000 | $16,000 | $5,000 | -$5,000 |
| **O&M Costs** | $2000 | $3,000 | -$1000 | -$1000 |
| **Annual Benefit** | $8,000 | $7,500 | $500 | -$500 |
| **Salvage Value** | $5,000 | $8,000 | $-3,000 | $3,000 |
| **IRR** | 23.2% | 24.8% |  |  |

NPV of delta = -5000 + 1500(P/A, i, 7) - 3000(P/F, i, 7)

Try MARR of 15%

NPV = -5000 + 1500(4.160) - 3000(.3759) = \_\_\_\_\_\_\_\_

Since NPV using MARR is positive, IRR > MARR. Pick larger initial investment A.

Since IRR of A-B is > 15%, pick biggest initial investment A. Alt B has a higher IRR but the difference between A and B can also be invested to give a return greater than the MARR of 15%.

6. A person is considering investing in a startup company. There are 3 possible outcomes being considered. Probability of the company failing within 2 years is 60%.The probability the company continues to grow after 2 years is 30%. The third possibility (the one the investor is hoping for), is the company will be bought within 2 years giving the investor a large profit. Construct a probability distribution table showing each possible outcome and the probability for each outcome. (Chapter 10)

|  |  |
| --- | --- |
|  | **Prob** |
| **Failing** |  |
| **Grows** |  |
| **Sold** |  |

7. An investment of 4 possible returns after 3 years as shown in the following table. What is the expected value of the return? (Chapter 10)

|  |  |
| --- | --- |
| **Return** | **Prob** |
| -$-6,000 | 10% |
| $0 | 35% |
| $1000 | 35% |
| $2000 | 20% |

|  |  |  |
| --- | --- | --- |
| Return | Probability | Answer |
| $-6,000 | 10% |  |
| $0 | $35 |  |
| $1,000 | $35 |  |
| $2,000 | $20 |  |
|  | Total= | Total= |