MBAS 821 Assignment 1 (Due on August 11th at 11:59pm through Course Portal)

1) Aaron has credit card debt of $25,000 that has an APR (monthly compounding) of 15%. Each month Aaron pays the minimum monthly payment only and he is required to pay only the outstanding interest. Aaron has received an offer in the mail for an otherwise identical credit card with an APR (monthly compounding) of 12%. After considering all alternatives, Aaron decides to switch cards, roll over the outstanding balance on the old card into the new card and borrow additional money as well. How much can Aaron borrow today on the new card without changing the minimum monthly payment that he will be required to pay?

**Monthly interest = 15%/12 = 1.25%**

**Monthly payment = 25000 x 1.25% = $312.5**

**New card monthly interest = 12%/12 = 1%**

**New card debt for $312.5 monthly payment = $312.5 / 1% = $31,250**

**Extra money that Aaron can spend = 31250 – 25000 = $6,250**

**Note: Do not recommend doing just minimum monthly payment.**

2) Assume that the interest rate is 10% per year. Ben is planning to retire in 40 years and hope to live for 25 years in retirement. Ben estimates that in retirement he will need to withdraw $40,000 per year (starting one year after retirement) so that he will just exhaust his savings with the 25th withdrawal. Ben plans to deposit in the bank a constant amount each year starting in one year and retire immediately after making the 40th deposit. What amount will Ben need to deposit in the bank account each year?

**First consider the annuity during 25 years of retirement, $40,000 every year**

**PV at time 0 (now) is:**

**Then consider the amount required to save (40 years of annuity) that is equivalent to PV of $8,022.26:**

**Solve for C we get:**

3) Smith Industries Ltd. is considering whether or not to invest in a project. The project requires an initial investment of $15,000. It will pay off $34,500 in the first year, but will require a settlement cost of $19,800 in the second year. What is the IRR of the project? At what cost of capital would Smith Industries Ltd. decide to invest in the project?

**CF**

**Year 0: -15,000**

**Year 1: +34,500**

**Year 2: -19,800**

**Apply IRR equation:**

**Solve for r (quadratic equation) we get:**

**From the graph we can see that Smith should only invest when its cost of capital is between 10% and 20%. (Students can use other methods to show this: e.g. plugging in numbers, or find derivatives, any reasonable methods are fine.)**

4) You are deciding between two mutually exclusive investment opportunities. Both require the same initial investment of $9.8 million. Investment A will generate $2.01 million per year (starting at the end of the first year) in perpetuity. Investment B will generate $1.47 million at the end of the first year and its revenues will grow at 2.6% per year for every year after that.

a. Which investment has the higher IRR?

b. Which investment has the higher NPV when the cost of capital is 7.8%?

**a)**

**Use (growing) perpetuity equations to find the IRRs of investments:**

**Investment A:**

**Solve for IRRA we get:**

**Investment B:**

**Solve for IRRB we get:**

**A has higher IRR.**

**b)**

5) Pear Inc. is deciding whether or not to invest in a new product in 2020. This investment would require $6 million investment in machinery and will have revenues and cost as follows.

|  |  |  |  |
| --- | --- | --- | --- |
| Year (in thousands of $) | 2021 | 2022 | 2023 |
| Sales | $10,000 | $12,000 | $14,000 |
| Manufacturing Costs | $3,000 | $4,000 | $5,000 |
| Marketing Costs | $2,000 | $0 | $0 |
| Inventory | $1,200 | $1,400 | $0 |
| Account Receivables | $1,000 | $1,200 | $0 |

Pear Inc. uses straight-line depreciation for the machinery and the machines will depreciate over 3 years. The corporate tax rate is 40% and the cost of capital is 7%. What is the NPV of the project?



**NPV of the project is $7,221,000.**

**Students can choose to use other formulas to calculate FCF. They can also choose to not use an excel and just list out the items consisting the FCF.**

**Note: the sign of Change in NWC is negative.**