Exam 4210 Spring 2020

1. Present value is defined as:
    a. *The current value of a future cash flow*
2. If the annual interest rate is 12%, what is the two-year discount factor?
    a. 1/(1,12)^2=1/1,2544=0,7972
3. The net present value formula for one period is:
    a. $C_0+C_1/(1+r)$
4. At an interest rate of 10%, which of the following sequences of cash flows should you prefer?

	Year 1	Year 2	Year 3
A	500	300	100
B	100	300	500
C	300	300	300
D	Any of the above as they all add up to 900		

    A as it has the highest present value

5. After retirement, you expect to live for 25 years. You would like to have $75,000 income each year. How much should you have saved in your retirement account to receive this income if the interest rate is 9% per year? (Assume that the payments start one year after your retirement.)
    a. PV = [(1/0.09) - (1/((0.09)(1.09^25)))] × 75,000 = 736,693.47. Alternatively, [(75,000/.09) × [1 - (1/(1.09^25))]] = 736,693.47.
6. Ms. Colonial has just taken out a $150,000 mortgage at an interest rate of 6% per year. If the mortgage calls for equal monthly payments for 20 years, what is the amount of each payment? (Assume monthly compounding or discounting.)
    a. PMT = 150,000/[(1/0.005) - 1/((0.005 × ((1 + 0.005)^240)))] = $1,074.65.
7. Consider two methods of evaluating capital investment projects. The first method incorporates the time value of money concept the other does not. Construct an example that shows why the second method gives the wrong answer on whether or not to invest in the project. (If you use an example/exercise from the textbook, you get zero points).
    a. *E.g., payback vs. npv. Trivial.*
8. Consider the internal rate of return (IRR) method of evaluating capital investment projects. Why cannot IRR distinguish between a borrowing project and a lending project?
9. Construct an example where you need to use the profitability index to rank the projects. (If you use an example or an exercise from the textbook, you get zero points).
    a. *Capital rationing. Trivial.*
10. How do you compare projects with different lives?
    a. *Calculate the equivalent annual cost/cash streams*

11. A project requires an initial investment of $200,000 and expects to produce a cash flow before taxes of 120,000 per year for two years (i.e. cash flows will occur at t = 1 and t = 2). The corporate tax rate is 30%. The assets will depreciate using the following year 3 schedule: (t = 1: 33%); (t = 2: 45%); (t = 3: 15%); (t = 4: 7%). The company's tax situation is such that it can use all applicable tax shields. The opportunity cost of capital is 11%. Assume that the asset can sell for book value at the end of the project. Calculate the approximate IRR for the project.
    a. *Year 1 cash flow: (120,000 × (1 - .30)) + (200,000 × .33 × .30) = 103,800;*
    Year 2 cash flow: (120,000 × (1 - .30)) + (200,000 × .45 × .30) + 44,000 = 155,000;
    0 = -200,000 + (103,800/(1 + IRR)) + (155,000/((1 + IRR)^2)) = 17.73%.
12. You are considering the purchase of one of two machines required in your production process. Machine A has a life of two years. Machine A costs $50 initially and then $70 per year in maintenance. Machine B has an initial cost of $90. It requires $40 in maintenance for each year of its three-year life. Either machine must be replaced at the end of its life. Which is the better machine for the firm? The discount rate is 15% and the tax rate is zero.
    a. *Machine A: Annuity factor = (1/.15) × (1 - (1/(1.15^2))) = 1.6257.*
    Machine B: Annuity factor = (1/.15) (1 - (1/(1.15^3))) = 2.2832.
    Costs:
    PV(A) = 50 + 70 (1.6257) = 163.80; EAC = 163.80/(1.6257) = 100.76;
    PV(B) = 90 + 40 (2.2832) = 181.33; EAC = 181.33/2.2832 = 79.42. (Accept the project with least annual cost.)
13. Briefly discuss various real options associated with capital budgeting projects.
    There are four types of real options. They are:
    • *options to expand.*
    • *options to abandon.*
    • *production options.*
    • *timing options.*

    Options to expand provide a firm with flexibility to expand but do not commit the firm to expand. Therefore, they add value to the project. These are call options.
    In many cases, the ability to terminate a project or abandon a project adds flexibility to the project. This is useful when the project fails to be profitable. Abandonment options are put options.
    Production options provide a firm with additional flexibility to alter inputs or processes. These have value when an input becomes scarce and needs to be replaced with an alternative. These production options add value to the project.
    Timing options: In many cases, a positive-NPV project need not be undertaken right away. It might be even more valuable if undertaken in the future. The ability to postpone a project also provides a firm with additional flexibility. These options add value to the project.
    A project may have multiple real options associated with it. Many projects might become positive-NPV projects if the real options associated with them are properly recognized and evaluated.

14. Give an example of a financial lease where the tax rate varies over the period of the lease. Construct an equivalent loan that has the same cash flow as the lease in every future period but

a lower immediate cash inflow. (Using an example from the textbook, or an exercise from the textbook/course, gives zero points).

   a. *No student got this correct. See text book for an example.*

15. Briefly explain how diversification reduces risk.
    a. *Diversification reduces risk because prices of different securities do not move exactly together. When you form portfolios using a large number of stocks, the variability of the portfolio is much less than the average variability of individual stocks.*