

Final Examination, BUS312, D1+ E1

NAME: _____

SFU Student number: _____

Instructions: For qualitative questions, point form is not an acceptable answer. For quantitative questions, an indication of how you arrived at particular numbers is required for the purpose of assigning part marks. This examination is composed of 9 questions and 9 pages (**not** equally marked for a total of 100). Please answer all questions on the examination. The examination period is 3 hour.

1. (10 points) Explain the difference between incremental cash flows and sunk cost.

2. (10 points) Yolanda Williams is 35 years old today and is beginning to plan for her retirement. She wants to set aside an equal amount at the end of each for the next 25 years so that she can retire at age 60. She expects to live to an age of 80 and wants to be able to withdraw \$50,000 per year from the account on her 61st through 80th birthdays. The account is expected to earn 10% per year for the entire period of time. Determine the size of the annual deposits that she must make.

3. (10 points) A senior executive is considering replacing one of the junior executives with a Honda Asimo robot that is capable of recognizing faces and gestures, as well as being able to walk and even climb stairs. She figures that she could argue strongly to the board that such “capital deepening” is necessary for the cost-conscious firm. Two days later, a feasibility study is completed, and the following data are presented to the president:
 - It would cost \$12,000 to purchase a robot with a life expectancy of 20 years at which its salvage value will be zero.
 - Annual expenses of using the robot would be \$4,000.
 - The junior executive’s annual salary is \$7,000.
 - The cost of the robot will be placed in class 8 with a CCA rate of 20%.
 - The firm’s marginal tax rate is 40%.
 - The firm’s current cost of capital is estimated at 11%.

On the basis of net present value criterion, should the robot be used (and the junior executive fired)?

4. (10 points) Big Time Company is planning to raise \$15 million by selling 10-year bonds. The bond rating agency has advised the company that the bonds will have an A rating. Currently, the difference between the yield to maturity of A-rate corporate bonds over similar maturity Government of Canada bonds is 1.50% (which is called the credit spread). If 10-year Canada bonds are currently priced to yield 5 percent, how many bonds (each with a face value of \$1000) will Big Time have to sell to raise the needed funds? What should their coupon rate be? Note that the convention is to set the coupon rate on the corporate bond issue so that the new bonds will sell at par value.

5. (10 points) City Garden Suppliers paid a \$1 dividend yesterday. It is expected that the dividend will grow at 10% per year for 4 years, 8% per year for 10 years, and then grow at 5% per year thereafter. If the investors' expected rate of return is 12%, what is the stock worth today?

6. (5 points) The efficiency gains resulting from a just-in-time inventory management system will allow a firm to reduce its level of inventories permanently by \$250,000. The firm's cost of capital is 7.5%. What is the most the firm should be willing to pay for installing the system?

7. The current market rate of interest on a term loan is 8.5 percent per annum (APR) compounded monthly.

(a) (5 marks) The loan has just been negotiated and the amount borrowed is \$12,000. Constant monthly payments are to be made for eight full years (first payment a month from today for a total of ninety six payments). What should the monthly payments be?

(b) (5 marks) Suppose the borrower and lender decide to renegotiate the \$12,000 loan so constant payments are to be made quarterly rather than monthly. The loan would still be paid off in eight full years (first payment one quarter from today for a total of 32 payments). What should the amount of the quarterly payments be? (Hint: the determination of the appropriate quarterly interest rate should be based upon equal effective annual rates).

(c) (5 marks) Ignoring tax effects, and other things equal, which of the above payment schemes, the one outlined in (a) or (b), would be preferred by (i) the borrower and (ii) the lender. Explain your answer fully.

8. You are planning to purchase a depreciable asset for \$10,000 which has a CCA rate of 30%. Your corporate tax rate is 40%. Before tax operating profit (cash revenues less cash expenses, i.e., (s-c)) on your investment into the indefinite future is \$4,350 per annum. Your firm uses a 10% discount rate to evaluate new real asset projects. Because you plan to operate this asset into the indefinite future, there is no anticipated salvage.

(a) (6 points) What is the NPV on the investment?

(b) (4 points) Is the internal rate of return on the investment greater than or lesser than 10%.

9. (10 points) Analyze the following newspaper column (no calculation is necessary):

"What's the best age for a person to start collecting Social Security benefits? According to conventional wisdom, the retirement starts at age 65. It's true that full benefits don't start until age 65, but 62 year olds can retire and collect 80% of their benefits.

Take the hypothetical cases of John and Mary, who have the same birthday and who are both slated to start drawing \$1,000 a month in Social Security benefits at age 65. On his 62nd birthday, John decides to go ahead and start claiming his benefits of \$800 a month (80 percent of \$1,000). Mary decides to wait until she's 65, when she can claim the full \$1,000. Three years later, Mary turns 65 and begins receiving \$1,000 a month from the Social Security Administration. John continues to receive \$800 a month. But he has already been paid \$28,800 while Mary has received nothing.

Five years go by, with Mary drawing \$1,000 a month and John \$800 a month. At 70, John has received \$76,800, compared with Mary's \$60,000. When they reach 77, Mary will pull ahead. So, it seems if a person doesn't live past 76, it would be better to start collecting Social Security benefits at 62. For those who reach their upper 70's, it pays to wait until they are 65 to collect Social Security.

(Adapted from Atlanta Business Chronicle, Gary Sumner, June 29, 1998).

10. (10 points) A corporation issued a bond on 1.1.1990 with a \$1,000 face value, maturing in 31.12.2015, and an 7% coupon interest rate; interest is paid annually on 31 of December of each year. The bond was initially priced at par. Years go by, and on 1.1.1995 the yield to maturity (YTM) on similar type of bond is 6%. Today, on 20.4.2004 the bond is again priced at par. What is the price and yield to maturity of the bond on 1.1.1990, on 1.1.1995, and on 20.4.2004?

Solutions

1. Incremental cash flows are the cash flows that will occur if a capital budgeting project is accepted. They will not occur if the investment is rejected. Sunk costs are costs that will occur whether a project is accepted or rejected. Financial managers must screen out sunk costs from the capital budgeting analysis to prevent distortion in cash flow estimates. Any distortion in these estimates will, in turn, lead to inaccurate NPV values and could result in poor capital budgeting decision.

2. At age 60 the PV of the desired annuity is.

$$PV = 50000 * PVAF(20, 10\%) = 50,000 * 8.514 = 425,700$$

The required annual payment need to create a FV annuity worth that sum is.

$$FV = 425,700 = C * FVAF(25, 10\%) = C * 98.347$$

$$C = \$4,329$$

3. The best way to solve the problem is to use the tax shield approach

$$PV = PV(\text{Net savings (not considering depreciation)}) + PV(\text{tax shield})$$

The after tax annual saving from using the robot compared to executive is $(7000 - 4000) * (1 - 0.4) = \$1,800$

$$\text{Thus, PV of Net savings} = 1800 * PVAF(20, 11\%) = 14,333.99$$

$$PV \text{ of tax shield} = (1.055/1.11) * (.4 * .2 * 12,000) / (0.11 + 0.2) = 2943.33$$

$$NPV = 14,333.99 + 2943.33 - 12,000 = 5277.32$$

Thus, the robot should replace the junior executive.

4. The new bonds must be priced to have a YTM of $5\% + 1.5\% = 6.5\%$.

To sell at par, the coupon rate on the new bonds must be set at 6.5%. At \$1000 per bond, Big Time must issue \$15 million/\$1000, or 15,000 bonds to raise the required \$15 million.

5. The best way to solve the problem is by using the growing annuity formula $C1/(r-g) * (1 - (1+g)/(1+r)^T)$

Years 1-4: $g=10\%$, $T=4$

$$C1 = 1.1 * 1 = 1.1 \rightarrow 1.1 * (.12 - .1) * (1 - (1.1/1.12)^4) = 3.82$$

Years 5-14: $g=8\%$, $T=10$

$$\text{Div}_4 = 1.1^4 = 1.4641: C1 = \text{Div}_5 = 1.08 * 1.4641 = 1.591228 \rightarrow 1.591228 * (.12 - .08) * (1 - (1.08/1.12)^{10}) = 12.0523$$

Years 15 and on: $g=5\%$

$$\text{Div}_{14} = 1.08^{10} * \text{Div}_4 = 1.08^{10} * 1.4641 = 3.1609: C1 = \text{Div}_{15} = 1.05 * 3.1609 = 3.3190$$

$$\rightarrow 3.3190 / (.12 - .05) = 47.41$$

$$PV = 3.82 + 12.0523 / (1.12^4) + 47.41 / (1.12^{14}) = 3.82 + 7.66 + 9.70 = 21.18$$

6. If the savings are permanent, it is worth \$250,000 to the firm. It can take \$250,000 out of the project now without ever having to replace it. So the most the firm should be willing to pay is \$250,000. The cost of capital is irrelevant for this question.

7.

(a) $12,000 = c * (1 - 1/(1 + 0.085/12)^{96}) / (0.085/12)$.

Solving for the payment, $c = \$172.71$,

(b) the effective quarterly rate is $(1 + 0.85/12)^3 - 1 = 2.1400\%$, payments are determined from

$12,000 = c * (1 - 1/(1.0214)^{32}) / 0.0214$, solving for the payment, $c = \$521.80$.

(c) *Other things equal*, both the borrower and the lender are indifferent to the two payments plans. This indifference arises because each plan has the same PV (by design), and both the borrower and lender make decisions based on PV.

8.

(a) Capital spending: -10,000

Operating profit: $4350 (1 - 0.4) = 2610$

NPV (excluding CCA) = $-10,000 + 2610/0.1 = 16100$

$$\begin{aligned} \text{PV(CCA tax shield)} &= \text{CdT} / (k + d) (1 + \frac{1}{2} k) / (1 + k) \\ &= 10,000 * .3 * .4 * (1 + .05) / (1.1 * .4) = 2863.64 \end{aligned}$$

$$\text{NPV} = 16,100 + 2863.64 = 18,963.64$$

(b) Because the NPV is positive at 10%, the IRR must be greater than 10%.

9. The author of the article did not consider the time value of money. In other words, he did not discount the cashflows received. At the age of 77 the two streams of cashflow have the same value (PV), only if we assume a zero discount rate.

In general, the higher the discount rate, the better is the option to take the money earlier at the age of 62 because this option gives the money sooner. The break even point age will be higher; the higher is the discount rate.

Note: some students may argue that if someone does not retire at 62, he earns even more than \$800 during the years 62-65. However, it is also true that if a person retires at 62, he may earn other income in another job. Thus, the idea is to compare the retirement annuity under the two scenarios.

10.

1.1.1990 – since bond is priced at PAR, its price is \$1,000 and the YTM=7%.

1.1.1995 – YTM goes down to 6%. There are 20 years of \$70 payments left.

$$\text{Price} = 70 * (1/0.06 - 1/(0.06 * 1.06^{20})) + 1000/1.06^{20} = 802.895 + 311.805 = 1114.70$$

20.4.2004 – bond is again priced at PAR. So, YTM is again 7%, and price \$1000.