WILFRID LAURIER UNIVERSITY
WATERLOO, ONTARIO

Session: Fall 2011 Midterm Exam
Course No.: BU383
Title: Financial Management I
Professor(s): W.J. McNally
Number of pages: 22
Length of examination: 2 hours
Examination aids allowed: Calculator (no keyboard), Dictionary (if foreign student)

The doors of the examination room will be opened approximately 10 minutes before the start of the examination. Candidates will be permitted to enter the examination room quietly up to one half hour after the scheduled start of the exam. Candidates arriving late will not be allowed any extra time.

Candidates must not begin the examination or attempt to read the examination questions until instructed to do so.

Candidates once having entered, may not leave the exam room before completing and submitting the exam unless accompanied by a Proctor. Candidates are not permitted to submit their examination and leave the examination room until 1 hour after the examination has begun, and in no case before their attendance has been taken. In no case may a candidate leave the room temporarily, for any reason, until 30 minutes after the start of the examination. In order that remaining candidates are not disrupted, candidates must remain seated and may not leave the examination room during the last 15 minutes of the examination session.

At the close of the examination period, candidates must stop writing immediately. The Presiding Officer may seize the papers of candidates who fail to observe this requirement, and a penalty may be imposed at the discretion of the instructor. Candidates must submit all their work, according to the instructions of the Presiding Officer, including all materials and a copy of the examination paper with their name and student ID number written on it. Unused examination booklets may not be taken from the examination room.

A candidate who leaves before the examination is over must hand in all completed and attempted work, notes made during the exam, and a copy of the examination paper with their name and student ID number on it.

Talk or any form of communication between candidates is absolutely forbidden. No information of any kind is to be written on the question paper or on scrap paper for the purpose of assisting other candidates. Responses to questions must not be done in an exaggerated way or in a manner that will involve transmission of information to others.

Candidates must remain seated during the examination period. A candidate needing to speak to the proctor (e.g. to ask for additional supplies or to request permission to leave the examination room for any reason) should so indicate by raising his or her hand.

Questions concerning possible errors, ambiguities or omissions in the examination paper must be directed to the proctor who will investigate them through the proper channels. The proctor is not permitted to answer questions other than those concerning the examination paper.

Candidates must not use or attempt to use any improper source of information. No candidates for an examination may bring into the examination room any books, notes or other material containing information pertaining to the examination unless the examiner has given instructions that such material will be allowed and this instruction is specified on the examination paper. Any item brought into the examination room is subject to inspection.

No briefcases, backpacks or other bags and carriers may be brought to the desk site where the candidate is writing the examination. These bags should be left outside the examination room. If books, notes etc. cannot be left outside the examination room, they must be put at the front of the examination room in a place designated by the proctor before a candidate takes a seat. Candidates are advised not to bring valuables to the examination room.

No electronic or communication devices will be allowed in the examination room, including cell phones, blackberries, pagers, etc. Calculators are not allowed unless specified by the instructor and indicated on the examination paper. Only non-programmable models authorized by the instructor will be allowed. It is the candidate's responsibility to ascertain whether the use of calculators is permitted, and, if it is, whether any restrictions are imposed on the types of calculators that may be brought to the examination.

Translation dictionaries (e.g. English-French) or other dictionaries, (thesaurus, definitions, technical) are not allowed unless specified by the instructor and indicated on the examination paper. Electronic dictionaries are never allowed.

Except for bottled water, no food or drink is allowed in the examination room. Candidates with health problems that warrant relaxation of this regulation should provide medical documentation to the presiding officer prior to the beginning of the examination. Such students should restrict themselves to those items and packaging that will least distract other examinees.

Candidates are expected to write their examinations in an honest and straightforward manner. Where there are reasonable grounds for believing a violation of exam protocol has occurred, the candidate will be subject to the disciplinary procedures and sanctions according to the University Calendar.

Only currently registered students will be permitted to write the final exam.

Examinations conducted at Wilfrid University will be bound by WLU regulations, regardless of where the candidate is registered.

Approved by Senate (Oct. 27/2003)

ADDITIONAL INSTRUCTIONS

BEFORE THE EXAM

1. Complete the personal identification portion of the multiple choice answer card. Shade in the boxes below your student number on BOTH sides of the Scantron card.
2. Your student number should be left-aligned in the field.
3. UofW students should create a 9-digit number by adding a '0' at the END of their UofW student number.
4. Make sure that you shade the letter 'A' Under "Test Form" or your exam will not be marked and you will receive a score of zero (0) for the multiple choice questions.

DURING THE EXAM

5. Count the pages to be certain that there are no missing pages.
6. **No questions will be answered by the proctors during the exam, except in the case of missing pages.**
7. **Students are NOT allowed to speak to one another during the exam.**
8. **You must sign the identification sheet before leaving.**
9. You are not allowed to use your own paper for rough work. If you need scrap paper, use the back side of each page or ask a proctor for scrap paper.
10. Closed book. No notes or books are permitted.
11. If, for any reason, you think that the correct answer is missing from the multiple choices, then select the best available answer. "Best" means the multiple choice which has the closest value to the correct answer in absolute value terms.
12. You are to stop writing immediately upon being told that the exam is over.
13. Assume a 365-day year throughout this exam.

AFTER THE EXAM

14. Both the multiple choice answer card and the exam MUST be handed in at the front of the exam room before you leave.

Sections, Questions and Time Budget

	# Questions	Marks
Section 1 – Qualitative	**6**	**3**
Section 2 – Numeric	**17**	**17**
TOTAL	**23**	**20**

Section 1 – Qualitative Questions (6 Questions)

½ mark each. In some questions, the correct answer is not amongst the multiple choices. For those questions, select the best available answer. That is, the answer which is closest to the correct answer.

1 The core idea of the The Bigger Fool Theory of valuation is:

A) Markets are irrational because investors are foolish
B) Small investors (fools) introduce noise into asset prices
C) Asset prices crash when fools panic
D) *An asset is worth what the next fool will pay for it

2 Suppose that you are reviewing a price sheet for bonds and see the following prices (per $100 par value) reported. Without calculating the price of each bond, which bond seems to be reported incorrectly?

Bond	Price	Coupon Rate	Yield
V	100	6%	6%
W	110	8%	6%
X	95	0%	5%
Y	107	7%	9%
Z	90	6%	9%

A) Bond V
B) Bond X
C) Bond Z
D) *Bond Y
E) Bond W

3 Which theory implies that the yield curve has a tendency to be upward-sloping?

A) Expectations Theory
B) *Maturity Preference Theory
C) Market Segmentation Theory
D) Rising Rate Theory
E) Future Use Lemma

4 Which of the following is the reason why Maturity Factoring is not a source of short-term financing?

A) Maturity factoring is a no-recourse arrangement
B) Maturity factoring is a credit, book-keeping and collection service
C) Maturity factoring is a repossession service
D) Maturity factoring is an asset-based loan and not a short-term liability

5 Which of the following is the reason why we say that yield to maturity is only 'approximately' equal to the return an investor will earn if she holds a bond to maturity?

A) The yield to maturity is not accurate because it is solved by trial-and-error
B) The yield is a nominal rate and not an effective annual rate
C) The yield incorporates an estimate for the reinvestment rate that may not be correct
D) The yield incorporates information from the treasury spot rate yield curve at the time of purchase only.

6 Which of the following is not an example of a bond covenant?

A) A restriction on the Debt-to-equity ratio
B) A restriction on the size of dividends to stock holders
C) A restriction on capital expenditures
D) A restriction on borrowing from other lenders
E) A restriction on the size of the call premium

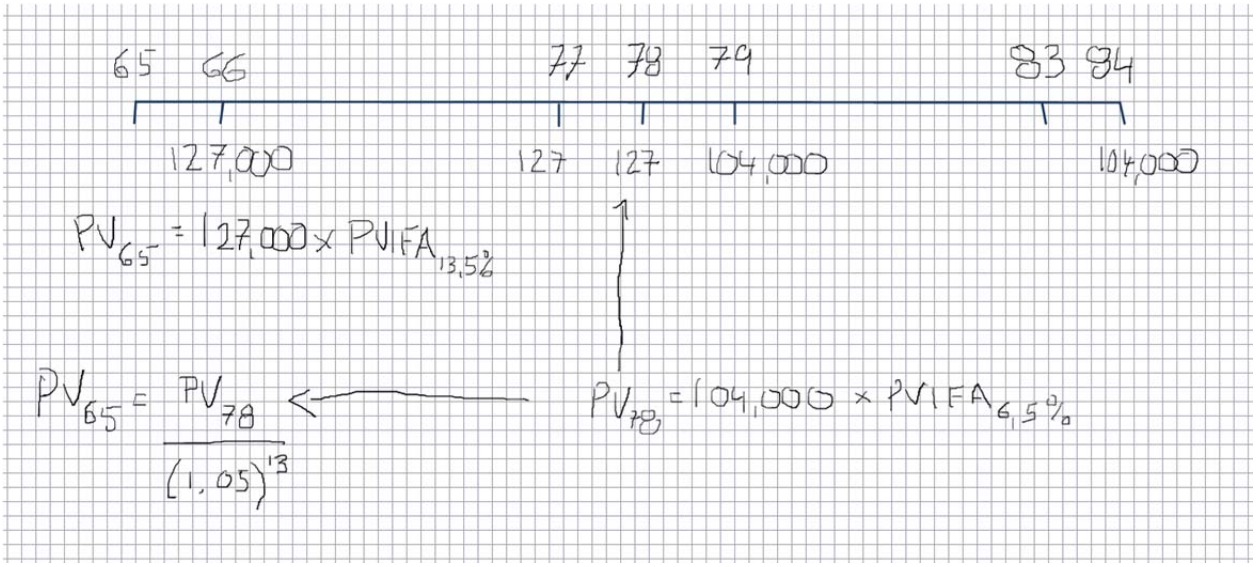
Section 2 – Numeric Multiple Choice (5 Questions)

1 mark each. In some questions, the correct answer is not amongst the multiple choices. For those questions, select the best available answer. That is, the answer which is closest to the correct answer.

7 You are trying to decide how much money you will need at retirement. You expect to retire at age 65. You hope to travel extensively while you are healthy enough. To finance your travels (and cover your basic living expenses) you think you will need income of $127,000 per year (at the end of each year). You will make your first withdrawal on your 66th birthday. You expect to stay healthy enough for travel for the first 13 years after retirement and thus make a withdrawal of $127,000 at the end of each of those 13 years. Once your active travel years are over you will settle down into a retirement home. During your retirement home years you will only need $104,000 in income per year. You expect to live in the retirement home for 6 years. You will make the first retirement home withdrawal 14 years after retirement and all subsequent withdrawals will continue to be at year-end. If retirement savings will earn a return of 5%, then how much will you need at retirement to fund these planned withdrawals?

A) $1,459,595
B) $1,472,926
C) $1,564,775
D) $1,653,922
E) $1,720,856

FULL SOLUTION:



The amount needed at retirement is the present value of the desired withdrawals. The two series of withdrawals are annuities. We will discount each separately in two steps. First, the retirement home annuity and then the travel annuity.

There are two annuities in this problem and so we will sovle Divide the cash flows into three parts: 1) one lump sum at the end of one year; 2) one lump sum at the end of two years; and 3) an annuity to be made for 11 years after that. Discount the three pieces separately and sum.

PV of the Retirement Home Annuity

The retirement home annuity has 6 (^^t1^^) end-of-period payments so it is an ordinary annuity. The present value formula for an ordinary annuity will generate the present value one year before the first withdrawal with is on the 78 (=[65+^^t1^^]) birthday. That present value will have to be further discounted 13 (^^t1^^) years to the retirement date on the 65th birthday.

STEP #1: PV of annuity

PVA = PMT x [1 – 1/(1+i)^n]/i

PVA = $104,000 x [1-1/(1+0.05)^6]/0.05

PVA = 104,000 x 5.075692

PVA = $527,871.97

STEP 2: Discount Annuity PV to retirement date

PV = PVA x 1/(1+i)^n
PV = $527,871.97 x 1/(1+0.05)^13
PV = $527,871.97 x 0.530321
PV = $279,941.78

PV of the Travel Years Annuity

The travel years annuity has ^^t1^^ end-of-period payments so it is an ordinary annuity.

STEP #1: PV of annuity

PVA = PMT x [1 – 1/(1+i)^n]/i

PVA = $127,000 x [1-1/(1+0.05)^13]/0.05

PVA = 127,000 x 9.393573

PVA = $1,192,983.77

Add up the present values of the two annuities to find the answer:

PV = $279,941.78+ $1,192,983.77

PV = $1,472,925.55

8 A perpetuity pays $550 at the end of every month. The PV of the perpetuity is $36,000. What is the nominal annual rate (APR) on the perpetuity?

A) *18.33%
B) 9.17%
C) 19.96%
D) 13.42%
E) 15.15%

SOLUTION: Let j = i/m. PV = PMT / j , 36,000 = 550 / j , j = 1.53%, i = j*m = 1.53% * 12 = 18.33%

9 Sarah found her dream lakefront home, valued at $250,000. She plans to buy a home just like it when she retires in 15 years. Sarah can earn 11% per year on her investments. The price of the house will increase 3% per year for the next 15 years. How much must she invest at the end of each of the next 15 years to finance the purchase?

A) *$11,320.67
B) $7,266.31
C) $8,952.82
D) $10,198.81
E) $12,565.95

SOLUTION: $FV = \$250{,}000(1.03)^{15} = \$389{,}491.85$, $FV_{annuity} = PMT*FVIFA_{11\%,15}$, $PMT = (\$389{,}491.85)/FVIFA_{11\%,15} = \$11{,}320.67$

10 As a graduation present, your father has given you $5000 to use as a down payment for a brand new Audi A4. The price of the A4 is $60000. You will get a 48-month lease at 7.9% APR. The buyout at the end of the lease term is 40% of its purchase price. What are the monthly lease payments?

A) *$900
B) $925
C) $950
D) $975
E) $1,000

Solution:
The lease payments are as follows:

1. First is a $5000 to be made immediately. The present value of this is $5000.

2. Next is a 48-month annuity due at a 7.9% APR. Divide the APR by 12 to find the monthly periodic rate.

3. Finally, 40% of the price of $60000 will be paid in one lump sum in 48 months.

The unknown is the monthly payments. Solve for the unknown by setting up a loan identity for the lease: the value of the car on the LHS and the present value of the payments on the RHS:

$60000 = $5000 + PMT * PVIFA-Due(j%,48) + 60000*0.40*PVIF(j%,48)
Where j = APR/12.

The only variable we don't know is PMT. We have all other information required to solve for PMT. So, rearrange the equation:

PMT = (60000-5000-(60000*0.40*PVIF(j%,48)))/PVIFA-Due(j%,48)

PMT = (60000-5000-(60000*0.40*0.7298))/41.311
PMT = 907.37

11 You buy a house for $800,000. You make a down payment of $150,000 and you arrange a mortgage loan with a principal of $650,000. The amortization period of the mortgage is 20 years and the bank has offered you a quoted rate of 6%. You elect to make weekly payments. What is the size of each mortgage loan payment?

A) $995
B) $1,023
C) *$1,066
D) $1,082
E) $1,184

Solution:

Determine the periodic rate j for 52 payment periods. (Remember that the bank is limited to an EAR based on its quoted rate compounded semi-annually.)

j = ((1 + 0.06/2)^(2/52)) - 1 = 0.001138

Number of periods is t = 52 * 20 = 1040

PMT * PVIFA(0.1138%,1040)= 650000

PMT = 650000/ 609.6087

Therefore, the payment is $1066.26

12 A BMW M3 is $70,000. BMW financial services charges interest at 3.9% APR. You elect to make end-of-year annual payments over a four year term. How much principal remains owing after your second payment?

A) $33,340
B) $34,340
C) $35,340
D) *$36,340
E) $37,340

SOLUTION:
i = 0.039
n = 4
PVIFA = 3.638466
PMT = $70,000/3.638466 = $19,238.88

$Principal_2$ = 19.238.88 * $PVIFA_{2,3.9\%}$

$Principal_2 = 19{,}238.88 * 1.8888$
$Principal_2 = 36{,}338.40$

Year	Interest Owing (EOY)	Payment	Principal Repaid	Principal Owing
1	$2,730.00	$19,238.88	$16,508.88	$53,491.12
2	2,086.15	19,238.88	17,152.72	36,338.40
3	1,417.20	19,238.88	17,821.68	18,516.72
4	722.15	19,238.88	18,516.72	0.00

13 The Bedford Savings and Loan offers local businesses a loan with a term of 90 days, nominal interest of 6% and a fee of 0.5% (annual fee pro-rated over the term of the loan and payable at maturity). What is the effective annual rate of the loan?

A) 6.00%
B) 6.15%
C) 6.5%
D) *6.67%
E) 6.93%

SOLUTION:

Interest = (0.06)*(90/365)*$100 = $1.4795
Fee = 0.005 *(90/365)*$100 = $0.1233

EAR = [1+ (Int + fee)/Principal]^(365/35) -1
EAR = [1 + ($1.4795 + $0.1233)/$100]^(365/90) -1
EAR = [1 + $1.6028/$100]^(365/90) -1
EAR = 0.06666

14 The Bedford Savings and Loan offers a one year variable rate loan with semi-annual compounding. Rates are expected to be 1% APR over the first half of the year and 1.5% APR over the second half. What is the effective annual rate of the loan?

A) 1.250%
B) 1.251%
C) 1.252%
D) 1.253%
E) *1.254%

SOLUTION:

EAR = [(1 + 0.005)*(1 + 0.0075)] – 1 = 0.012538

15 The Cambridge Toyota plant offers parts suppliers credit terms on a 1/10 net 35 basis. What is the effective annual rate implied if suppliers choose not to take the discount but rather pay the full cost after 35 days?

A) *16%
B) 17%
C) 18%
D) 19%
E) 20%

SOLUTION:
EAR = [1 + 1/99]^(365/25) -1 = 0.158

16 M&M Meats supplies meats to a variety of restaurants in the Tri-cities area. M&M offers all customers credit and collects all of its receivables exactly 35 days after the sale. M&M has one book-keeper whose sole responsibility is managing accounts receivable and that individual is paid $2,000 (per 35 day period). At present M&M has $200,000 of accounts receivables. M&M is currently replacing a number of its freezers and needs funds to pay for the capital expenditures. It is considering factoring its receivables as a means of financing the new freezers. Alex Lawrie Factors provide advance factoring services to businesses in the Tri-cities area. Alex Lawrie will lend 75% of the value of M&M's receivables. Alex Lawrie charges a 1.5% commission (on the value of all receivables) and lends at Prime (which is 4%) plus 3%. What is the effective rate of the advance factoring to M&M?

A) 11%
B) 12%
C) 13%
D) 14%
E) *15%

SOLUTION:

Principal = 0.75 * $200,000 = $150,000
Interest = (0.04 + 0.03)*(35/365)*$150,000 = $1,006.85
Fee = 0.015 * $200,000 = $3,000

EAR = [1+ (Int + fee – Savings)/Principal]^(365/35) -1
EAR = [1 + ($1,006.85 + $3,000 - $2,000)/$150,000]^(365/35) -1
EAR = [1 + $2,006.85/$150,000]^(365/35) -1
EAR = 0.1487

17 Consider a 6-year corporate bond issued by Vandelay Industries. The bond has a face value of $1,000, and has an annual coupon rate of 6.8%. The yield to maturity of the bond is 8.2%. What is the fair price for the bond today?

A) $961.29
B) $935.67
C) $1000.92
D) $1000.00
E) $623.21

SOLUTION:
In this situation, the price will be equal to the present value of all payments being made in the future. Those payments are 6 coupons at $68 each, plus the $1,000 face value which you will get at the bonds maturity in 6 years.

P = 68*(1-(1+0.082)^(-6))/0.082+1000/(1+0.082)^(6)

P = $935.67

18 To raise funds to pay for its feed-in tariff (FIT) program, the Ontario Government issued bonds. The bonds, called “Sun Bonds” have a face value of $1,000, 15 years to maturity and a 7% coupon rate (annual coupons with the first coupon due in one year). The bonds are priced at $771.82. What is the yield to maturity of the Sun Bonds?

A) 6%
B) 7%
C) 9%
D) *10%

SOLUTION:
PV = I*[1 - (1 + Kb)^(-N)]/Kb + F/(1 + Kb)^(N)

771.82 = 70*[1- (1+Kb)^(-15)]/Kb +1000/(1+Kb)^15

Kb = 10%

19 Which of these bonds' prices is more sensitive to changes in interest rates?

Maturity	Issuer	Coupon Rate
10	U.S. Government	6%
20	Amtrak	4%
5	Verizon	5.5%

A) the U.S. Government bond
B) There is not enough information to determine this
C) *the Amtrak bond
D) the Verizon bond

20 The Government of Canada has a 22 year bond that matures today in 22 years and has a face value of $1,000. The bond has a coupon rate of 3.4%, paid semi-annually. The yield on the bond is 7%. If coupons are re-invested at 3.9% per annum, then how much interest is earned on re-invested coupons over the life of the bond? Calculate the interest as a percentage of the total cash flows received by the bondholder. (Express your answer as a percentage rounded to the nearest percent point. e.g., 14.56% = 15%)

A) 18%
B) *19%
C) 20%
D) 21%
E) 22%

SOLUTION:

First determine how much interest was earned on reinvesting the coupons at 3.9%.

FV of coupons at maturity = 17 ({[1+(0.039/2)]^44} - 1) / (0.039/2) = 1167.3704

Thus interest earned on reinvested coupons is FV of coupons - $ coupons received:

1167.3704 - 44*17 = 419.3704

As a percentage of the total cash flows from the bond (coupons plus principal), the interest earned on coupons is:

419.3704 / ($1000 + 1167.3704) = 19%

21 Use the term structure of interest rates shown below to calculate the expected (one-year) spot rate from year 1 to year 2.

Term	Spot Rate
1-year	6.5%
2-years	8%

A) 7.25%
B) 8.00%
C) 8.50%
D) *9.50%
E) 10.00%

SOLUTION:

Under the Expectations hypothesis, the forward rate is equal to the expected future spot rate.

The forward rate is given by:
(1+f) = ((1+y2)^2)/(1+y1)
where y2 = the two year spot rate, and y1 is the one year spot rate.

In this example, f = 9.52%

22 A Government of Canada 2-year coupon bond has a face value of $1,000 and pays annual coupons of $75. The next coupon is due in one year. What is the correct price for the coupon bond at time zero (immediately)? Use the term structure of interest rates shown below to answer the question.

Term	Spot Rate
1-year	6.5%
2-years	8%

A) $980
B) *$990
C) $1,000
D) $1,010
E) $1,020

SOLUTION:

The price of the coupon bond is the present value of the bond's cash flows discounted at the spot rate appropriate for each maturity (from the term structure of interest rates).

P = 75 * PVIF(6.5,1) + (75 + 1,000) * PVIF(8,2)

P = 75 * 0.939 + (75 + 1,000) * 0.8573

P = $992.06

23 A US Government 4% coupon bond has 10 years remaining to maturity. The bond pays annual coupons and the next coupon is due in one year. The face value of the bond is $100. The bond is currently trading for $74.08 and yields 6%. If you buy the bond today, hold it for one year and sell it after the next coupon, then what is your capital gain? Express your answer as a percentage and assume that bond yields don't change over the year.

A) 0.6%
B) 1.6%
C) 2.6%
D) 4%
E) 6%

SOLUTION: CG rate = yield – coupon yield. CG rate = 0.06 – 4/74.08 = 0.006 or 0.6%

Final Exam Formula Sheet

$$PVIF_{t,r} = \frac{1}{(1+r)^t} = (1+r)^{-t}$$

$$FVIF_{t,r} = (1+r)^t$$

$$PVIFA_{t,r} = \frac{1}{r}\left[1 - (1+r)^{-t}\right]$$

$$FVIFA_{t,r} = \frac{1}{r}\left[(1+r)^t - 1\right]$$

$$PVIFA\text{-}Due_{t,r} = \frac{1}{r}\left[1 - (1+r)^{-t}\right](1+r)$$

$$FVIFA\text{-}Due_{t,r} = \frac{1}{r}\left[(1+r)^t - 1\right](1+r)$$

$$PV = FVe^{-rt}$$

$$f_t = \frac{(1+r_t)^t}{(1+r_{t-1})^{t-1}} - 1$$

$$EAR = \left(1 + \frac{r}{m}\right)^m - 1$$

$$j = \left[1 + \frac{q}{2}\right]^{2/m} - 1$$

$$r_{EAR} = \left[1 + \left(\frac{Interest + Fees - Savings}{Net\ Amount\ Borrowed}\right)\right]^{365/Days\ to\ maturity} - 1$$

$$Quoted\,Rate = \frac{F - P}{P} \cdot \frac{365}{Term}$$

$$P_{zero} = \frac{\$F_t}{(1+r)^t}$$

$$P_{coup} = \$C \cdot \frac{1}{r}\left[1 - (1+r)^{-t}\right] + \frac{\$F}{(1+r)^t}$$

$$r_n = r_r + \pi + r_r\pi$$

$$YTM = \frac{\$C + \frac{\$F - Price}{t}}{\frac{\$F + Price}{2}}$$

$$P = \sum_{t=1}^{\infty} \frac{D}{(1+r)^t} = \frac{D}{r}$$

$$P = \sum_{t=1}^{\infty} \frac{D_0(1+g)^t}{(1+r)^t} = \frac{D_0(1+g)}{r-g} = \frac{D_1}{r-g}$$

$$\frac{P_o}{EPS_1} = \frac{Payout\ Ratio}{r-g}$$

g = Retention ratio * ROE
g = (1-Payout ratio) * ROE
g = (1-o)*y

$$P = \frac{TP_0(1+g)}{r-g} = \frac{TP_1}{r-g}$$

$$Return = \frac{P_t - P_{t-1}}{P_{t-1}} + \frac{C_t}{P_{t-1}}$$

$$Return = \frac{P_t - P_{t-1}}{P_{t-1}} + \frac{D_t}{P_{t-1}}$$