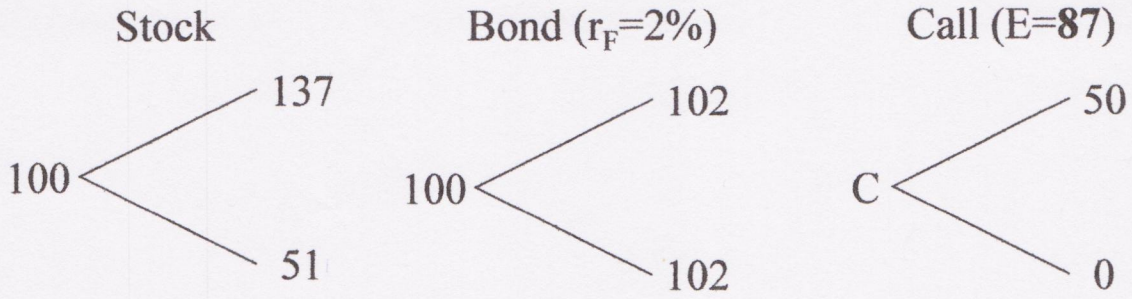
Problem 1 [10 points]



1-year call option, S=100, E=**87**, r_F=2% (annual)
1 step per year

How much should the call option worth?

Problem 2 [10 points]

Company Miami just paid annual dividend of $25 today. The dividend is expected to grow at 5% for the next 3 years, then it will grow at 3% in perpetuity. If stocks of similar company earn 12% annual return, what is the price of a share of Company Miami stock?

Problem 3 [15 points]

Table below shows the historical returns for Companies A, B and C

Year	Company A	Company B	Company C
1	30%	26%	47%
2	7%	15%	-54%
3	18%	-14%	15%
4	-22%	-15%	7%
5	-14%	2%	-28%
6	10%	-18%	40%
7	26%	42%	17%
8	-10%	30%	-23%
9	-3%	-32%	-4%
10	38%	28%	75%
11	27.0%	23.4%	42.3%
12	6.3%	13.5%	-48.6%
13	16.2%	-12.6%	13.5%
14	-19.8%	-13.5%	6.3%
15	-12.6%	1.8%	-25.2%
16	9.0%	-16.2%	36.0%
17	23.4%	37.8%	15.3%
18	-9.0%	27.0%	-20.7%
19	-2.7%	-28.8%	-3.6%
20	34.2%	25.2%	67.5%

1. If one investor has a portfolio consisting of 65% Company A and 35% Company B, what are the average portfolio return and standard deviation? What is Sharpe ratio if the risk-free rate is 3.5%?

2. If another investor has a portfolio consisting of 2/3 Company A, 1/6 Company B and 1/6 Company C, what are the average portfolio return and standard deviation? What is Sharpe ratio if the risk-free rate is 3.5%?

(4)

Problem 4 [15 points]

You currently have $2,500,000. You want to invest it in the following three assets: 10-year US Treasury bond with coupon rate 3.5%, Blandy and Gourmange stocks, who have the following historical annual returns:

Year	Blandy	Gourmange
1	26.0%	47.0%
2	15.0%	-54.0%
3	-14.0%	15.0%
4	-15.0%	7.0%
5	2.0%	-28.0%
6	-10.0%	40.0%
7	22.0%	17.0%
8	30.0%	-23.0%
9	-32.0%	-4.0%
10	28.0%	75.0%
11	28.6%	51.7%
12	16.5%	-59.4%
13	-15.4%	16.5%
14	-16.5%	7.7%
15	2.2%	-30.8%
16	-11.0%	44.0%
17	62.2%	18.7%
18	33.0%	-25.3%
19	-35.2%	-4.4%
20	50.8%	82.5%
21	23.4%	42.3%
22	13.5%	-48.6%
23	-12.6%	13.5%
24	-13.5%	6.3%
25	1.8%	-25.2%
26	-9.0%	36.0%
27	18.8%	15.3%
28	27.0%	-20.7%
29	-28.8%	-3.6%
30	25.2%	67.5%

Your goal is to have the expected annual return of 7.2% with a minimum portfolio risk. How much money should you allocate to these three assets?

Problem 5 [20 points]

A real estate investor has the following information on an office building:

- Purchase price is $1,250,000 with acquisition costs of $52,500
- 35,000 leasable square feet
- Initial rent of $15/sq. ft. per year and will increase 1.5 percent per year
- Vacancy rate of 8% of gross rent per year
- Operating expenses are 35% of effective gross income
- Three financing choices:

    1. All equity without any financing;

    2. Mortgage with **75%** LTV ratio, 15 years, annual payments and **3.5%** contract rate;

    3. Mortgage with **95%** LTV ratio, 15 years, annual payments and **5.0%** contract rate;

- Expected increase in value is 3.5% per year. Holding period is 15 years, and 5% selling expenses
- For simplicity, assuming that no capital improvement over the entire holding period
- 75% depreciable
- Investor's tax rate is 28%, and capital gain tax rate is 15%.

Questions:

1. Compute equity **after-tax** cash flows from year 1 to year 15 for each financing choice.

2. What is the equity **after-tax** return (internal rate of return) for each financing choice and which choice would you like to make?

6.

Problem 6 [10 points]

We currently have the once-in-a-generation low interest rate environment, and the rates are likely to increase in the next decade. If you recently graduated from college and have a decent job, you have decided to purchase a relative expansive house to your income. Suppose that a bank offers you three types of mortgages: adjusted rate mortgage (ARM), fixed-rate mortgage with constant payments (FRM) and graduated payment mortgage (GPM). Which type of mortgage should you choose and **why?**

7.

Problem 7 [10 points]

You buy a house of $800,000 today. You put a down payment of 20% and borrow a fixed-rate mortgage of $640,000 with monthly payments, annual interest rate of 3.5% and 30 years. After 5 years (60 months), market interest rate goes up to 6.5%. How much money will you make from the mortgage if you continue to pay the monthly mortgages for the next 25 years and the market interest rate will stay the same as 6.5%? **Show your detailed calculations**

8.

Problem 8 [10 points]

Suppose that Federal Reserve actions have caused an increase in the risk-free rate, r_{RF}. Meanwhile, investors are afraid of a recession, so the market risk premium, (r_M - r_{RF}), has increased. Under these conditions, with other things held constant, which of the following statements is most correct **and why**?

1. The required return on all stocks would increase, but the increase would be greatest for stocks with betas of less than 1.0.
2. The prices of all stocks would decline, but the decline would be greatest for the highest-beta stocks.
3. The prices of all stocks would increase, but the increase would be greatest for the highest-beta stocks.
4. The required return on all stocks would increase by the same amount.