Question 1:

You are the team leader of the Wealth Management department of DreamFinance Bank, a Swiss bank specializing in wealth management and asset management.

a) You begin your week with a meeting with one of your clients, Mrs. Smith. She has CHF 400,000 in your bank, and everything is currently held in cash only. You are asked to construct a portfolio for her with the highest expected return. You may invest in the asset classes presented in Table 1 below. For Mrs. Smith, the strategic allocation is not less than 50% in bonds. Also, the position in stocks must not generate losses of more than CHF 25,000 with 5% probability. In addition, assume the stocks' return follows the normal distributions with the mean of 9% p.a. and the standard deviation of 18% p.a.

Table 1: Expected asset class returns

Asset class	Expected annual return
Bonds	2%
Stocks	9%
Hedge funds	7%

a1) Explain qualitatively Mrs. Smith's optimal asset allocation. How much do you need to invest in absolute terms in each asset class to reach this optimal asset allocation? Explain and show your calculations. (8 points)

a2) The expected net annual changes (over the next 1 year) in value for each asset class are given in Table 2 below. Assume the tax rate on the annual change is 15% of the total return for each asset class. Complete Table 2 and calculate the after-tax performance of each asset class and of Mrs. Smith's portfolio over a year (Round to the second decimal place.)

Table 2: Expected net annual changes in value for each asset class (next year)

Asset class	**Initial allocation**	**Annual change in value**	**Taxes**	**Net Asset value after 1 year**	**After-tax performance (in %)**
Bonds		+ CHF 3,000			
Stocks		+ CHF 6,700			
Hedge funds		+ CHF 5,500			
Total	CHF 400,000				

[Note: If you did not answer question a1) then use the following allocation: CHF 250,000 in bonds, CHF 100,000 in stocks and CHF 50,000 in hedge funds.] (6 points)

a3) According to a forecast update, the expected annual return for the bonds class is now 2.5%. Does this new information change the weights of the initial optimal asset allocation? Explain your answer. (No calculation required.) (3 points)

b) On Tuesday, another client, Mr. Green needs your advice for an asset allocation decision for the next year. For simplicity, you suppose the assets' universe of Mr. Green is only a Bond fund and an Equity fund. Ignore any taxes. Mr. Green also told you that he does not want to have any cash in his portfolio as the cash rate (risk-free asset) is equal to zero.

Mr. Green currently holds a EUR 1 million portfolio (P) with 25% in the Equity fund and 75% in the Bond fund. He would like to have a maximum Value at risk (VaR at 5%) of 10% of the invested amount for the next year.

Mr. Green does not want any short positions. The annual forecasts which are assumed to be normally distributed are provided in Table 3.

Table 3: Annual forecast of fund returns

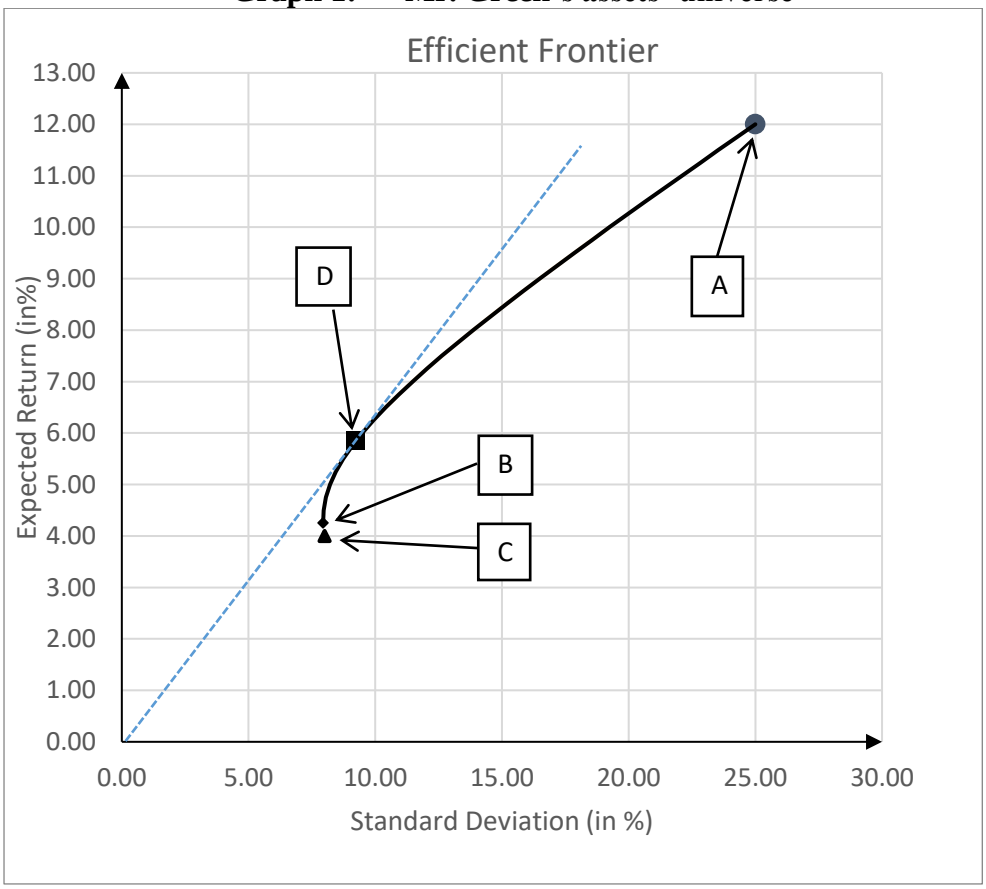
Fund	Expected annual return	Volatility (risk)
Equity	12%	25%
Bond	4%	8%

We also know that bond and equity returns have a correlation coefficient of 0.2.

You calculate the global minimum risk portfolio weights as: 4% for the Equity fund and 96% for the Bond fund.

b1) The following Graph 1 represents Mr. Green's assets' universe. Answer the following questions.

Graph 1: Mr. Green's assets' universe



i) Identify the portfolios A, B, C and D in Graph 1 and briefly describe them. (4 points)

ii) Why is the efficient frontier a curve instead of a straight line? Explain briefly by giving 2 reasons. (2 points)

iii) Why is portfolio C close but not on the efficient frontier? Explain briefly. (3 points)