Problem Set 2

 # 1: For each of the portfolios whose value functions are listed, identify the allocation to each asset, whether the porfolio is long or short in the particular asset, identify any holdings of cash or debt, in any currency. The meaning of the notation is: $S_{\text{IBM}}(t)$ is the share price of IBM stock; $S_{\text{GE}}(t)$ is the share price for GE stock; $E(t)$ is the Euro/USD exchange rate, r_d is the risk free rate in domestic (USD) currency, and r_f is the risk free rate in the foreign(Euro) currency.

a) $V(t) = 200S_{\text{IBM}}(t) - 1000e^{r_f t}E(t)$

b) $V(t) = -650S_{\text{GE}}(t) + 9000e^{r_d t}$

c) $V(t) = 3000S_{\text{IBM}}(t) + 5000S_{\text{GE}}(t) - 5000e^{r_f t}E(t) - 12000e^{r_d t}$

d) $V(t) = 8000S_{\text{GE}}(t) - 2000S_{\text{IBM}}(t) + 5000e^{r_f t}E(t) - 15000e^{r_d t}$

 # 2: Write down the value function of a portfolio with an initial allocation of \$100,000 worth of Euros, and \$50,000 of domestic (USD) cash. Assume the risk free rate in Euro is 3%, the domestic risk free rate is 6%, and that the initial Euro/USD exchange rate is \$1.25/Euro. How much is this portfolio worth 5 years later if the Euro/USD exchange rate in 5 years is \$1.18/Euro?

 # 3: Write down the value function for a portfolio that is long in 1000 shares each of 2 companies, A and B, and short in 2000 shares of company C. You will need to introduce your own notation for this (Hint: extend the notation used in the lecture example). Suppose that the share prices of companies A, B, and C are \$45, \$60 and \$55. What is the portfolio's value? Suppose you want to reduce the short position by 1500 shares. How could you accomplish this without spending any money?

 # 4: Explain how you would take a short position on the JPY/USD exchange rate (JPY=Japanese Yen). Now suppose you have a portfolio with a short position in 2,500,000 Yen, a cash holding of \$30,000, your home currency, and a short position in 500 shares of company XYZ stock. Write the value function for this portfolio, introducing your own notation. What is the value of this portfolio in 2 years if the JPY risk free rate is 5%, the USD risk free rate is 7% and in 2 years XYZ stock is trading for \$12 per share, and the JPY/USD exchange rate is \$0.01/Yen?

 # 5: Suppose $S_{\text{EZ}}(t)$ is a European stock, based in the Eurozone, whose stock is denominated in Euros. Let $E(t)$ be the Euro/USD exchange rate. Assuming you are a US based investor and all your accounts must be denominated in USD, how would you represent a holding of 200 shares of this stock in the value function of your portfolio? Write down the value function of a portfolio consisting of this holding of European stock, 100 shares of IBM and a debt of \$12,000. How much is this portfolio worth in 3 years if the USD risk free rate is 6% and if in 3 years the European stock is trading for 80 Euros/share, IBM is \$120 per share and the Euro/USD exchange rate is \$1.28/Euro.