BUSI504 – Statistical and Quantitative Methods
Assignment 2 – Jorit Nuehs    Date: 16.02.2007

1.

a. Sample Mean: $x = \frac{\sum_{i=1}^{n} X_i}{n} = \frac{10+(-16)+(-8)+20}{4}$ = **1,50%**

b. Weighted Mean: $\frac{\sum \omega_i x_i}{\sum \omega_i} = \frac{(10*10)+(-16*15)+(-8*20)+(20*25)}{70}$ = **2,86%**

c. The weighted mean in b) is more appropriate because it takes the price of the average expenditure into account. In our textbook it is used as a tool for portfolio diversification and asset allocation (page 210).

2.

a.

| Year | Stock A Return | Stock B Return | Portfolio AB Return --> (A+B)/2 |
|---|---|---|---|
| 2002 | 30% | -10% | **10%** |
| 2003 | -5% | 25% | **10%** |
| 2004 | 35% | -15% | **10%** |
| 2005 | -10% | 30% | **10%** |
| 2006 | 10% | 10% | **10%** |

b. Average Return of Stock A:

$$x = \frac{\sum_{i=1}^{n} X_i}{n} = \frac{30\%+(-5\%)+35\%+(-10\%)+10\%}{5}$$ = **12%**

c. Variance:

$$s^2 = \frac{\sum_{i=1}^{n}(x_i - x)^2}{n-1} = \frac{(30-12)^2+(-5-12)^2+(35-12)^2+(-10-12)^2+(10-12)^2}{5-1}$$

= 407,5
Standard Deviation: $s = \sqrt{407,5}$ = **20,20%**

d. Average Return of Stock AB: $\frac{5*10\%}{5} = 10\%$

Variance:

$$s^2 = \frac{\sum_{i=1}^{n}(x_i - x)^2}{n-1} = \frac{(10-10)^2+(10-10)^2+(10-10)^2+(10-10)^2+(10-10)^2}{5-1}$$

= 0 → Standard Deviation = **0%**

e. If we compare the two stocks in every year we can see that it is always the case that either stock A or stock B has a positive result but never both. Furthermore in every year they add up to a 10% surplus combined as they are weighted equally. The average return (mean) is therefore 10%. Because every year has the same result the standard deviation is 0%.

f. In the financial sector it is common to diversify a portfolio to reduce the risk so that you have a wide range of stocks. One stock has a quite high risk whereas another one has a quite low risk and combined the portfolio is not very volatile and not dependent on single stocks. It might be the goal of a portfolio manager to reduce the risk as far as possible but in reality it is very unlikely to have a standard deviation of 0%.In fact it is practised in reality to minimize the risk of the different stock so that there is "only" the risk of the market left.

3. Please see next page for decision tree.

   a. $P(A \cap B) = P(A) * P(B | A)$ = 0,6 * 0,3 = **0,18**

   b. $P(\overline{A} \cap B) = P(\overline{A}) * P(B | \overline{A})$ = 0,4 * 0,6 = **0,24**

   c. $P(A \cup B) = P(A\overline{B}) + P(\overline{A}B)$ = 0,42 + 0,24 = **0,66**