APM466 Midterm 1 - March 3, 2010

Question 1. Consider the following two coupon-bearing government issued bonds:

Maturity date	**Coupon**	**Price**
June 4, 2010	\$2	\$102
December 4, 2010	\$2	\$102

Calculate the 9-month risk-free yield rate.

Question 2. A stock is valued at \$75 today. An option will pay \$1 the first time the stock reaches \$100 in value, which it is assumed will happen with probability 1 at some point in the future. Find the price of the option, and the replicating portfolio.

Question 3. A stock is valued at \$1 today. In a year, its price S_1 can be worth either \$2 or \$0.50. A convertible bond will pay

$$\max(1, S_1),$$

a year from now. Assuming 0 interest rates, calculate the current price of the convertible bond.

Question 4. With interest rates equal to 0, two different stocks S_1 and S_2, both valued at \$1 today, can be worth \$2 or \$0.50 at some point in the future. If the option that pays \$1 when both $S_1 = S_2 = \$2$ is traded in the market and is worth \$0.125, calculate the price and replicating portfolio of the option that pays \$1 when $S_1 = \$2$ but $S_2 = \$0.5$. (You can leave the answer expressed in matricial form if you prefer).