1. (omit)

2. (omit)

3. Consider a simple financial model with two times, $t = 0, 1$, a single stock, $S$, which pays no dividends, and a one period interest rate $r = .08$. The initial price per share of the stock is $S_0 = \$40$. Consider a contract that requires it's owner to receive one share of stock in exchange for a payment of $K$ at time $t = 1$.

    (a) What is the value of such a contract at $t = 0$ if $K = \$45$? If $K = \$35$?

    (b) Find the payment $K$ that makes the value of the contract at $t = 0$ equal to zero. This value of $K$ is called the *forward price* of the stock at time 0 for delivery at time 1, denoted $\mathcal{F}_{0,1}$.

4. (omit)

5. Consider a simple financial market with three times $t = 0, 1, 2$ and a domestic currency, say dollars, and a foreign currency, say British pounds. In this model, we can

    - Exchange any amount of dollars and pounds at $t = 0$ at the exchange rate $E_\$^£ = 1.5$, i.e. it costs \$1.50 to purchase one pound at time 0.

    - Borrow or invest any amount of dollars between $t = 0$ and $t = 1$ at the one-period interest rate $r_0^\$ = .08$ and borrow or invest any amount of dollars between $t = 1$ and $t = 2$ at the one-period interest rate $r_1^\$ = .12$. An amount $\alpha$ invested at $t = i$ will grow to the amount $\alpha(1 + r_i^\$)$ at $t = i + 1$. Similarly for loans. (In particular, an amount $\alpha$ invested at $t = 0$ and left in the bank until $t = 2$ will grow to $\alpha(1.08)(1.12)$ at $t = 2$.)

    - Borrow or invest any amount of pounds between $t = 0$ and $t = 1$ at the one-period interest rate $r_0^£ = .10$ and borrow or invest any amount of pounds between $t = 1$ and $t = 2$ at the one-period interest rate $r_1^p = .15$.

   Consider a contract made between two investors A and B at $t = 0$ in which it is agreed that Investor A will pay Investor B \$2 at each of the times $t = 1$ and $t = 2$ and Investor B will pay Investor A £2 at each of the times $t = 1$ and $t = 2$. Find the arbitrage-free price, in dollars, of Investor A's position at $t = 0$.