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 its 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 $F_{0,1}$.

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 $E_{S}^{\£} = 1.5$, 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 $r_{0}^{S} = .08$ and borrow or invest any amount of dollars between $t = 1$ and $t = 2$ at the one-period interest rate $r_{1}^{S} = .12$. An amount $\alpha$ invested at $t = i$ will grow to the amount $\alpha(1 + r_{i}^{S})$ 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 $r_{1}^{\£} = .15$.

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 $t = 0$. 
