Question 1

Suppose:

- *XYZ stock has a price of* \$50 *and pays no dividends*.
- *The risk free effective annual interest rate is* 10%.
- *Eren buys a three year forward and earns a profit of* 13.45 *at expiration* .

Determine the spot price of the stock in year 3 (S_3).

Profit of a long position on a three year forward $= S_3 - F_{0,3}$

Thus Eren's profit is :

$$S_3 - F_{0,3} = 13.45$$
$$S_3 - 50 \cdot (1.1)^3 = 13.45$$
$$S_3 = 80$$

Question 2

An investor is interested in buying XYZ stock and you are given :

- *The current price of stock is* \$30 *per share*.
- *This stock pays dividends at an annual continuous rate of* 0.02.
- *The risk– free annual effective rate of interest is* 0.045.

What is the price of prepaid forward contract which expires in 18 *months*?

We have a continuous dividants so , $F^P_{0,T} = S_0 \cdot e^{-\delta T}$

$$F^P_{0,\frac{18}{12}} = 30 \cdot e^{-0.02 \cdot \frac{18}{12}} = 29.11336601$$

What is the price of forward contract which expires in 18 *months*?

$$F_{0,T} = FV\left(F^P_{0,T}\right)$$
$$F_{0,T} = (29.11336601) \cdot (1.045)^{\frac{18}{12}} = 31.1004631$$

Question 3

S&P 500 *is currently at* 1100, *A company decides to enter into* 8 *S&P* 500 *future contracts*. *you're given*:

- *S&P* 500 *trade on* 250 *units of index*.
- *Margin is* 10% *of the notional value*.
- *There is a weekly settlement* (1 year = 52 weeks).
- *Continuously compounded interest rate is* 6%.

If the S&P 500 *futures price drops by* 72.01, *to* 1027.99, *Calcultae the new margin balance*.

Notional value $= 8 \cdot 250 \cdot 1100 = 2{,}200{,}000$

Initial margin $= (0.1) \cdot 2{,}200{,}000 = 220{,}000$

New Margin Blance $= 220{,}000 \cdot e^{0.06\left(\frac{1}{52}\right)} - 8 \cdot 250 \cdot 72.01 = 76{,}233.99$