Fi8000 – Quiz #1

1. Calculate the following:

1a. The required monthly rate of return on a 1-month T-bill (a zero coupon bond, with face-value or principal of $10,000 and maturity in 1 month) is 0.7%. **What is the current price of the T-bill?**

1b. A 3-months T-bill (a zero coupon bond, with face-value or principal of $10,000 and maturity in 3 months) is traded today for $9,567. **What is the 3-months yield (3-months rate of return) of the T-bill?**

1c. A corporate bond with face-value (principal) of $1,000 and maturity in 5 years, pays an annual coupon (interest) of 8%. **What is the current price of the bond if the required annual rate of return is 7%?**

1d. Suppose you are trying to borrow $240,000 to buy a house on a conventional 30-year mortgage with equal monthly payments (due at the end of the month). The monthly interest rate on this loan is 1%. **What is the monthly payment on the loan?**

2. Calculate the following:

2a. The (effective) annual interest rate is 12%. **What is the (effective) 6-months interest rate?**

2b. The (effective) monthly interest rate is 1%. **What is the (effective) 6-months interest rate?**

2c. The annual interest rate is 12% compounded monthly. **What is the effective annual interest rate?**

2d. The annual interest rate is 12% compounded semi-annually. **What is the (effective) monthly interest rate?**
3. The XYZ corporation pays dividends annually.

3a. XYZ will pay a dividend of $5 a share a year from now, and investors expect the dividend to grow at a constant annual rate of 3% forever. **What is the current price of a share of XYZ** if the required annual rate of return on an investment in that stock is 10%?

3b. XYZ has just paid a dividend of $5 a share yesterday, and investors expect the dividend to grow at a constant annual rate of 3% forever. **What is the required annual rate of return on an investment in that stock** if the current price is $80?

3c. XYZ has just paid a dividend of $5 a share yesterday, and investors expect the dividend to grow at a constant annual rate of g. The price of XYZ’s stock today is $100 and the required annual rate of return on an investment in that stock is 10%. **What is g?**

3d. XYZ has just paid a dividend of $5 a share yesterday. This dividend is expected to grow at 12% per year for two year and at 3% forever thereafter. **What is the current price of a share of XYZ** if the required annual rate of return on an investment in that stock is 10%?

4. Barbara wants to save money to meet 2 objectives:

i. She would like to be able to retire 25 years from now and **have a pension for 15 years** after that. She would like to get the first annual payment on the pension 26 years from now, she would like it to be $30,000 and she would like it to grow at the rate of 3% per year from then onwards (for 15 years).

ii. She would also like to purchase a $25,000 car, 10 year from now.

The interest rate (cost of capital) Barbara can lend and borrow at is 6% per year. Assume she deposits the same amount $S$ at the end of each year for 25 years, with the first deposit of annual savings being 1 year from now.
4a. Write down the CF stream of the pension plan described in (i) (i.e. the 15 annual pension payments made to Barbara after she retires. Use a timeline and write down the CFs, growth rate and cost of capital).

4b. Write down the CF stream of the purchase of the car described in (ii).

4c. What is the present value of Barbara’s planned expenses (described in (i) and (ii): pension plan and car)?

4d. Write down the CF stream of the savings plan (use the notation $S$ for the unknown annual deposits).

4e. What is the amount $S$ such that Barbara will exactly be able to meet her objectives (described in (i) and (ii): pension plan and car)?

5. A scenario analysis of Sugarcane, a big Hawaiian sugar company, looks like this:

<table>
<thead>
<tr>
<th></th>
<th>Bullish Stock Market</th>
<th>Bearish Stock Market</th>
<th>Sugar Crisis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability</td>
<td>0.4</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>Rate of Return - $R$</td>
<td>2%</td>
<td>(-6)%</td>
<td>34%</td>
</tr>
</tbody>
</table>

5a. Calculate the expected rate of return, $E(R)$.

5b. Calculate the standard deviation of the return, $\sigma_R$.

5c. Assume an initial wealth of $100 (all invested in the Sugarcane stock). Write down the three possible dollar returns ($D$) and calculate the expected dollar return, $E(D)$.

5d. Assume an initial wealth of $100 (all invested in the Sugarcane stock), and an investor with a utility function $U(W) = \ln(W)$ (where $W$ is the final wealth, equal to the initial investment plus the dollar return). Write down the three possible values of the final wealth ($W$) and calculate the expected utility of the final wealth, $EU(W)$. 
