The Digital Economist

Intermediate Macroeconomics
Worksheet #7: **Present Value Calculations** Name:_____

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1. Given the following:

$$PV_{bond} = \sum_{t=1}^{n} R_t(1+r)^{-t} + F(1+r)^{-n} = \frac{R_t[1-(1+r)^{-n}]}{r} + \frac{F}{(1+r)^n}$$

Calculate the following for a $1000 -- 30 year bond issued at 6% interest.

a. The Present Value of the first five interest payments (r_{mkt} = 6%) :

b. The Present Value of this bond two years after it was originally sold (r_{mkt} = 6%):

c. The Present Value of this bond two years after it was originally sold (r_{mkt} = 8%):

2. Calculate the Total Rate of Return on this bond assuming that you paid full face value when it was issued and held it for exactly one year. However, in selling the bond, market interest rates had risen to 7%:

$$TRR = \frac{R_t + P_{sold} - P_{paid}}{P_{paid}}$$

3. You have choice between two assets:

i. **Asset 1** which pays a single payment 'FP' of $5000 at the end of 24 months.
ii. **Asset 2** which pays $2,400 at the end of 12 months and $2500 at the end of 24 months.

The current price of each asset is $3500.

a. Calculate the rate of interest 'r' by which you would be indifferent between these two assets.

b. If the market rate of interest is 10% (r = 0.10) and **Asset 2** is priced at $3500, how much would you be willing to pay for **Asset 1** such that the present value of these two assets were equal?

4. Calculate the present value of an asset that pays a net return 'FP' of $450 annually over a 20 year period with the first payment received at the end of year five. (20 payments total). The annual rate of interest to be used is 5%. Show your work.

5. Which asset would be preferred: the asset described in problem #4 or an asset that pays $400 over a 20 year period with the first payment received at the end of year 1. (20 payments total). Use the same rate of interest (5%) and explain your answer. How is a drop in the market rate of interest likely to affect your answer

6. How much would you bid on a $10,000 twelve-month T-bill if your desired annual yield is 8%? How much would you bid on a 6-month T-bills?

7. Calculate the *effective rate of interest* 'r_e' given an annual rate of interest 'r' of 8% compounded quarterly. Perform the same calculate for monthly compounding.