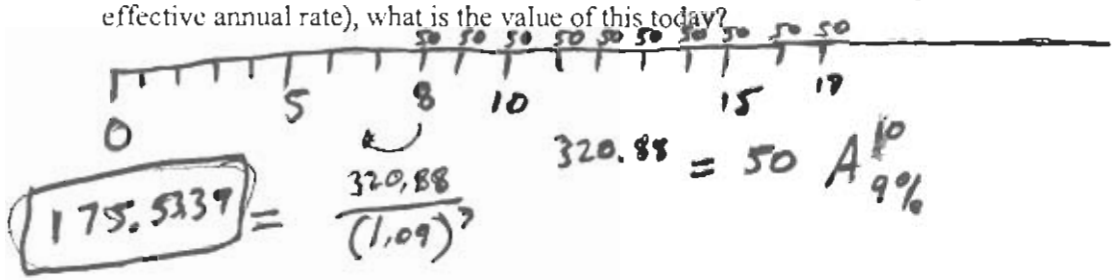
Problems from Chapters 4, 5, and 7

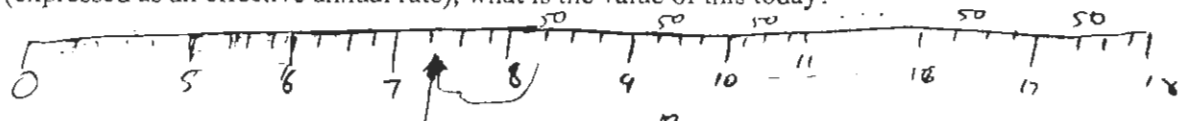
1. Suppose someone will pay you $50 a year for ten years. However, the first payment of $50 won't start until 8 years from now. If interest rates are 9% (expressed as an effective annual rate), what is the value of this today?



$320.88 = 50\ A^{10}_{9\%}$

$175.5339 = \frac{320.88}{(1.09)^7}$

2. Suppose someone will pay you $50 a year for ten years. However, the first payment of $50 won't start until 8 years and three months from now. If interest rates are 9% (expressed as an effective annual rate), what is the value of this today?



$171.79 = \frac{320.88 = 50\ A^{10}_{9\%}}{(1.09)^{7.25}}$

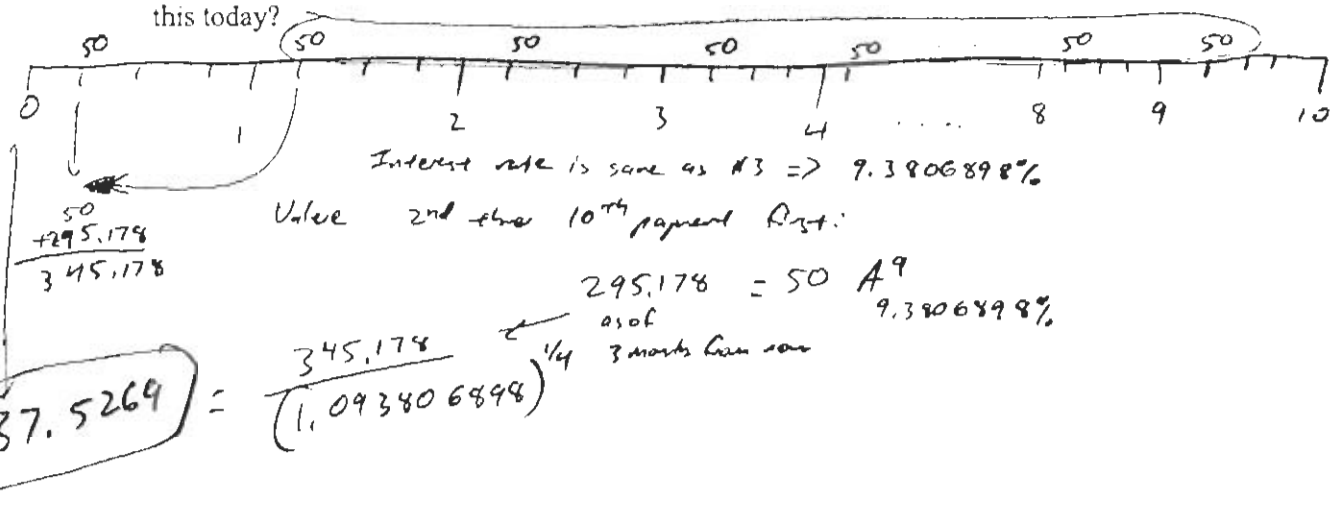
3. Suppose someone will pay you $50 a year for ten years. However, the first payment of $50 won't start until 8 years and three months from now. If interest rates are 9%, compounded monthly, what is the value of this today?

Same time line as #2

Interest rate is $\left(1 + \frac{.09}{12}\right)^{12} - 1 = 9.3806898\%$

$164.7339675 = \frac{315.5752}{(1.093806898)^{7.25}} = 50\ A^{10}_{9.3806898\%}$

4. Suppose someone will pay you $50 a year for ten years, with the first payment three months from now. If interest rates are 9%, compounded monthly, what is the value of this today?



Interest rate is same as #3 => 9.380689 8%

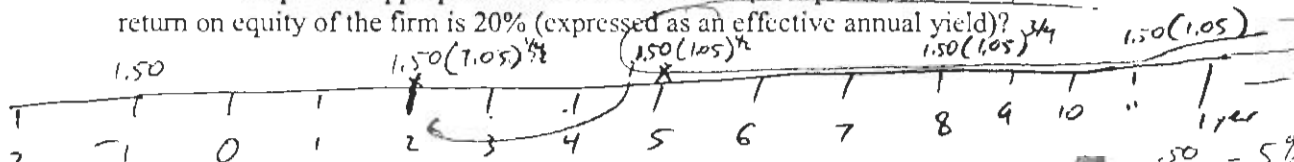
Value 2nd thru 10th payment first:

$295.178 = 50\ A^{9}_{9.380689\,8\%}$ as of 3 months from now

50 + 295.178 = 345.178

$337.5269 = \frac{345.178}{(1.093806898)^{1/4}}$

5. One month ago, MAG Corp. recorded earnings of $2.00 and paid a $1.50 dividend. Assuming MAG Corp. pays its dividends quarterly, what is the most you would pay for MAG Corp if the appropriate discount rate is 12%, compounded monthly and the return on equity of the firm is 20% (expressed as an effective annual yield)?



get R quarterly. $(1.01)^3 - 1 = 3.0301\%$ per quarter

First find growth rate annually: $g = ROE \times \text{plowback} = .25 \times \frac{.50}{2.00} = 5\%$

Second, quarterly: $(1.05)^{1/4} - 1 = 1.2272235\%$ per quarter

Next, value second div. on 1/2

$85.255 = \frac{1.50(1.05)}{.030301 - .012272235}$ as of 2 months from now

$85.06364332 = \frac{86.7734}{(1.01)^2} = \frac{85.255 + 1.50(1.05)^{1/4}}{(1.01)^2}$ at time period zero

6. What is the price of a nine-year 8% annual coupon bond with a face value of $1000 if the appropriate discount rate is 9% (effective annual rate)?

$\frac{80}{.09}\left[1 - \frac{1}{(1.09)^9}\right] + \frac{1000}{(1.09)^9} = 940.0475311$

7. What is the price of a nine-year 8% semi-annual coupon bond with a face value of $1000 if the appropriate discount rate is 9% (effective annual rate)?

$(1.09)^{1/2} - 1 = 4.403065\%$

$950.6065147 = \frac{40}{.044030651}\left[1 - \frac{1}{(1.044030651)^{18}}\right] + \frac{1000}{(1.09)^9}$