Wilf Csaplar Jr. ECON/BUSI 205 Homework #3 **Due Friday 2/23**

Place your name on the back of this sheet of paper and nowhere else. Staple your answers on the front of this sheet of paper. Failure to follow these directions will cost you 10 points. If you use double-sided printing or write on the back of scrap paper, I will give you one additional point.

Show all work for all questions which have work.

1) (20 points) Suppose you win the Publishers' Clearinghouse "$1000 per week forever" contest. Set up the series of the sum of the sequence of the present value of the payments assuming you want a 2% annual return. (In other words, tell me the series s_n which corresponds to the sum of the a_n where a_n is the present value of the nth payment.) Prove the series s_n converges. Use the properties of a geometric series to fine the value of all payments combined. State how you found the answer.

2A) (20 points) Suppose you are a sophomore and you are trying to decide if you should finish your education. Next year will cost you $40,000 and the after that $45,000. If you get a job now, you will earn $44,000 per year. Assume the real value (not present value) of your pay is the same every year until you retire after working 46 years. If you graduate, you will earn $48,000 per year with no change in real value. Se up the calculation to determine if the two years is worth it if you want a 5% real return. State how you got the numbers in each place. Using the formula for a truncated series - not a calculator - determine if the education is worth it. State what you did and show all work. (For your own peace of mind, you may want to use the calculator to verify your conclusion.)
B) (5 points) How would the equation and/or calculation change if I asked you to find the internal rate of return? Explain your logic without bothering to do the calculation.
C) (5 points) How would the equation change if you got a 1% real increase every year regardless of whether you went to school or not? Explain your logic without doing the calculation.

3) (20 points) Set up the calculation to find the going return on a bond with a face value of $1000, a coupon rate of 4%, with interest paid quarterly, matures in 2½ years, and is selling for $1010. Briefly explain how you decided what numbers go where and how you would use the formula to find your answer if you had to. (Do not worry about the calculation.)

4A) (15 points) Determine if the tax function below is continuous at every point and if it is differentiable at ever point. Explain your logic.
B) (15 points) Plot the graph from Part A.

$$taxes = \begin{cases} 0 & 0 < income \le \$10,000 \\ .1 * income - \$1,000 & \$10,000 < income \le \$30,000 \\ .2 * income - \$4,000 & \$30,000 < income \le \$50,000 \\ .3 * income - \$7,000 & income > \$50,000 \end{cases}$$