ECON 329 – International Finance
Prof. Cronovich

Worksheet: Present Value

Assume everyone can "borrow" or "lend" at the same interest rate, $r = 0.06$. Savers are lenders. "Lending" can take different forms, such as: depositing money in the bank, purchasing a bond, or making a loan directly to a borrower. "Borrowing" also takes various forms, such as taking out a loan from the bank, or selling a bond.

1a. If you borrow \$94.34 for one year, how much will you owe in one year?

1b. If you know you will receive \$100 in one year, but want to spend the money now, what amount could you borrow today that you would be able to pay off in one year with the \$100 you receive at that time?

1c. Which is better, getting \$94.34 today or getting \$100.00 in one year? (Ignore the time and administrative costs of taking out and repaying loans and focus only on the monetary costs.)

2a. For this problem only, $r = 0.04$. If you know you will receive \$500 in one year, but want to spend the money now, what amount could you borrow today that you would be able to pay off in one year with the \$500 you receive at that time? Note: This problem is asking you to compute the present value of \$500 to be received in one year.

2b. What calculation did you perform to calculate the answer to 2a?

2c. The amount you'll receive in one year is \$A. The interest rate, in decimal form, is r. Write down a formula for the present value of \$A.

3a. Redo 2a assuming the interest rate is $r = 0.08$.

3b. How does an increase in the interest rate affect the present value of a future amount? Explain.

4a. (We're back to $r = 0.06$.) You have \$100 today that you will not need to spend for 2 years. If you lend this money for two years at the market interest rate, you will have \$A in two years. Find \$A.

4b. What is the present value of \$A to be received in 2 years (where \$A is your answer to 4a)?

4c. Write down a formula for the present value of any amount \$A to be received in two years (i.e., the formula should actually include "A" rather than the particular value of "A" you solved for in 4a and used in 4b).

5a. Write down a formula for the present value of any amount \$A to be received in 3 years, assuming the market interest rate every year equals r. (Use "r" rather than a particular value like 0.06.)

5b. Write down a formula for the present value of any amount \$A to be received in N years.

6. A bond issued by Apple Corporation matures 3 years from today and pays \$1000 at that time. In addition, the bond pays \$50 in one year, \$50 in two years, and \$50 in three years. The most you should pay for this bond is the present value of the stream of payments you would receive from holding this bond. Calculate this amount, assuming $r = 0.06$.

7. Let Y_t denote your income in year t, where t is the number of years from the current year. Thus, Y_0 is your income this year (or 0 years from now), Y_1 is your income next year (1 year from now), Y_2 is your income two years from now, and so on. Suppose you work and earn labor income in each of the years 0 through 5 and then retire (and earn no labor income during retirement), and suppose the interest rate, denoted r, is the same in all years. Write down an expression for the present value of your labor income.