Time Value of Money

Assume that you are 30 years old today and expect to retire when you reach age 65. If you were to retire *today*, you would like a fixed (pretax) income of $60,000 per year (in addition to Social Security) for a period of 15 years (your approximate life expectancy at age 65). However, you realize that price inflation will erode the purchasing power of the dollar over the next 35 years and you want to adjust your desired retirement income at age 65 to reflect the decline in the purchasing power of the dollar. In addition to the fixed annual income, payable at the *beginning* of each year starting at age 65, you want to have assets (that is, securities investments) of $1,000,000, either for your own needs or to donate to heirs, when you reach 80 years old.

Empirical studies have estimated the average compound rate of price inflation and returns on stocks and bonds over the past 70 years to be approximately:

	Compound Rate
Inflation	3%
Common stocks	11
Corporate bonds	6
Equally weighted portfolio	8.5
(50% common stocks, 50% bonds)	

Assume that these rates will remain the same over the next 50 years and that you can earn these rates of return, after transactions costs, by investing in stock and/or bond index mutual funds. Also assume that contributions to your retirement fund are made at the *end* of each year. Finally, assume that income taxes on the returns from any retirement investments (for example, IRAs or 401(k) plans) can be deferred until you withdraw the funds beginning at age 65.

1. Determine your required inflation-adjusted annual (pretax) income at age 65. Assume that this annual amount remains constant from age 65 to age 80.
2. Determine the amount you must accumulate by age 65 to meet your retirement goal, assuming that you invest in
   a. Common stocks
   b. Corporate bonds
   c. Equally weighted portfolio (50 percent common stocks, 50 percent bonds)
3. Determine the annual investment in *common stocks* required to accumulate the funds determined in question 2, assuming that the first payment is made at age
   a. 30
   b. 40
   c. 50
4. Determine the annual investment in *corporate bonds* required to accumulate the funds determined in question 2, assuming that the first payment is made at age
   a. 30
   b. 40
   c. 50

5. Determine the annual investment in an *equally weighted portfolio* (50 percent common stocks, 50 percent bonds) required to accumulate the funds determined in question 2, assuming that the first payment is made at age
   a. 30
   b. 40
   c. 50

6. What conclusions can be drawn from the answers to questions 3, 4, and 5?