Math 107– Compounding interest

1. To save money for a boat, Valerie deposits $5000 in an account paying 8% compounded monthly
   a) How much will she have for her boat in 10 years?
   b) What is the annual yield on this account?
2. Mr. Wildman is setting up a trust fund for his favorite Math 107 students. How much does he need to invest today if he wants to have $1000000 in ten years and he can get 10% interest compounded annually? What if he can get 10% compounded quarterly?
3. You would like to retire a millionaire! You plan on retiring in 40 years and using historical data you determine that a 5% interest rate compounded quarterly is a reasonable expectation. How much do you need to invest now to have $1000000 in 40 years? How much of the $1000000 that you have earned is interest?
4. Rosa invests $3000 in an account with an APR of 4% and annual compounding. Julian invests $2500 in an account with an APR for 5% an annual compounding
   a) Compute the balance on each account after 5 years and 20 years
   b) Determine, for each account and for 5 and 20 years, the percentage of the balance that is interest?
5. Suppose you want to accumulate $120000 for your retirement in 30 years. You have two plans available to you: Plan A is a single deposit into an account with annual compounding of 5%. Plan B is a single deposit into an account with monthly compounding an APR of 4.9%. How much to you need to deposit in each account to make your goal?

6. Many organizations use endowments to provide operating expenses or benefits. An endowment is established when a large principal is deposited in an account. After that only interest is withdrawn for expenses without depleting the principal. Suppose scholarship endowment is established with a generous gift of $50000
   a) If the interest is compounded monthly at an annual rate of 5.5%, does the account generate enough interest to provide a $2500 scholarship every year? Explain
   b) If annual interest rate drops to 4.8% per year (still with monthly compounding) does the account generate enough interest to provide a $2500 scholarship every year? Explain
   c) Estimate (using trial and error) the minimum interest rate that will allow the fund to pay out a $2500 scholarship each year.

7. The following Dilbert cartoon jokes about making $1000000 by investing $100 at an APR of 5% and waiting 190 years. How much does the investment really make?