

In Part 2 of this assignment, you will follow up on what you studied in Part 1. You will work on questions #1–3 in class today with a group of your classmates. Question #4 you should do at home before next Monday, and involves watching one more short video.

1. Start by reviewing Part 1 of the assignment with your group. Make sure everyone in your group understands the annual compound interest formula:

$$A_t = A_0(1 + r)^t$$

In particular, you should discuss and understand the following:

- what do each of the variables in the formula represent?
 - where (and **why**) is there an integer exponent in the formula?
2. Suppose you want to start saving money for the future. You deposit \$500 in savings account which pays 4% interest, compounded annually. Use the compound interest formula (and a calculator!) to calculate how much money you will have in your account after
 - a. 10 years:

$$A_{10} =$$

- b. 20 years:

$$A_{20} =$$

In the questions above, we are given the amount of the initial deposit A_0 , the interest rate r , and a time horizon t , and we use the formula to calculate A_t .

Now suppose that we are given A_0 , t , and we know the value of the investment at that time, A_t . We can manipulate the formula to solve for the interest rate r .

3. Starting with the annual compound interest formula, use algebra to solve for r (in terms of A_0 , A_t and t). Your formula should have a rational exponent in it!

$$A_t = A_0(1 + r)^t \implies$$

In finance, this is sometimes called the compound annual growth rate (abbreviated as “CAGR”; see https://en.wikipedia.org/wiki/Compound_annual_growth_rate and <http://www.investopedia.com/terms/c/cagr.asp>). In fact, you can check your answer to #3 against the formulas on those pages. You can also check against the textbook—the formula appears in Section 6.2 (see Example 6).

For the last part of this assignment, you will look at how the annual compound interest formula is generalized to account for “multiple compound periods.” Watch the PatrickJMT video at <http://patrickjmt.com/compound-interest-more-than-once-per-year/>; also available at <https://www.youtube.com/watch?v=3vN-6DA79N0>).

4. The video starts works through an example with an initial deposit (i.e., principal) of $A_0 = \$100$ invested at interest rate (“annual percentage rate,” or *APR*) of 12% (i.e., $r = 0.12$, which is compounded quarterly (i.e., $n = 4$ times per year). You should understand each step of this example.

Write down the general formula PatrickJMT uses to calculate the amount in the account after t years:

$$A_t =$$