

Math 111 Week 8 Review

This review is not all inclusive. You are expected to know how to do all the problems in the homework.

Worksheet 17: Additive and Multiplicative Sequences

1. A **sequence** is a list of numbers in some specific order.
2. **ADDITIVE**: A sequence is **additive** if the next term equals some fixed number (the **increment**, r) added to the previous term.

$$\text{RECURSIVE FORMULA: } S(k+1) = S(k) + r,$$

$$\text{EXPLICIT FORMULA: } S(k) = S(0) + rk.$$

3. **MULTIPLICATIVE**: A sequence is **multiplicative** if the next term equals some fixed number (the **multiplier**, m) multiplied by the previous term.

$$\text{RECURSIVE FORMULA: } M(k+1) = mM(k),$$

$$\text{EXPLICIT FORMULA: } M(k) = M(0)m^k.$$

4. TESTING A SEQUENCE:

- (a) If the differences, **NEXT-PREVIOUS**, is always the same number, then the sequence is additive.
 - (b) If the division, $\frac{\text{NEXT}}{\text{PREVIOUS}}$, is always the same number, then the sequence is multiplicative.
5. The proportionate change is the ratio of change in value between to terms in the sequence with respect to the previous value of a sequence.

$$\text{PROPORTIONATE CHANGE} = \frac{\text{NEW VALUE} - \text{OLD VALUE}}{\text{OLD VALUE}},$$

$$\text{PERCENTAGE CHANGE} = 100 \times \text{PROPORTIONATE CHANGE} .$$

6. For a multiplicative sequence, the proportionate change from k to $k+1$ is always equal to one less than the multiplier. This is important for instance in the following situation:

“An increase in value of 8%” = “A proportionate change of 0.08” = “multiply by the multiplier 1.08”.

Worksheet 18: The Compound Amount Formula (CAF)

1. CAF: The amount of money in an account is given by:

$$A = P(1+r)^N, \text{ where}$$

- P = principal = amount initially deposited.
 - r = interest rate **for each compounding period**, as a decimal.
 - N = number of times compounded has taken place.
 - A = amount in the account after N compoundings.
2. **IMPORTANT NOTE**: r is not necessarily the annual rate. For this formula, r is the rate for each period of compounding. Later, we will adjust this formula to answer questions when the annual rate is given.

Worksheet 19: Using CAF to solve problems

1. This section is getting comfortable with using the formula: $B(k) = B(0)m^k$ and $A = P(1+r)^N$.
2. **WORDING ISSUES**:
 - “Find the present value...” means that you are going to be given A (or $B(k)$) and you need to find P (or $B(0)$). Other ways to say this: “How much should you start with?” or “How many bacteria must you have now...”.
 - “Find the future value...” means that you are going to be given P (or $B(0)$) and you need to find A (or $B(k)$). Other ways to say this: “How much will you have..”