

**Read each question carefully and be sure to SHOW ALL WORK. Correct answer without proper justification will not receive a “Complete” grade. Pac fat! Good luck!**

Name: \_\_\_\_\_

**LO 3. Sequences [CORE].** I know various ways to represent sequences and extract information from them.

**Criteria for Success:** I can

- use the exact formula or recurrence relation of a sequence to list its terms
- find the exact formula and/or recurrence relation for a sequence
- recognize and analyze arithmetic and geometric sequences
- determine if a sequence is monotonic or not, and bounded or unbounded

**Question:** Consider the sequence given by the recurrence relation:  $a_0 = -3$ ,  $a_n = a_{n-1} + 2$  for  $n \geq 1$ .

- (a) Write down the next three terms of the sequence, and find an exact formula describing it.
- (b) For each of the following properties of the sequence explain why they're true or false: arithmetic, geometric, bounded, monotonic, alternating.

**LO 5. Vectors and Sequences Challenge.** I can work with vectors and sequences creatively in new situations that require a deep understanding of them.

**Criteria for Success:** I can solve conceptual questions related to vectors that lie on the top half of Bloom's Taxonomy (analyze, evaluate, and create).

**Question:** A plane is flying on a straight line from city A (1, 2) to city B (7, 10), where the coordinate locations are in miles from our position at the origin O (0, 0). We are told that the plane is at location P,  $\frac{1}{3}$  of the way from city A to city B. Since the distances involved are small, you may assume a flat surface. (Side note: As I was writing this question, I was quite surprised to find out the Guinness record for the shortest commercial flight is 1.7 miles long and takes about 47-53 seconds.)

- (a) Find the coordinate representation of the vectors  $\vec{OA}$ ,  $\vec{OB}$ ,  $\vec{AB}$ , and represent all of them geometrically on a coordinate grid.
- (b) Visually estimate where point P is located, and label it on the above coordinate grid. Then use the above vectors and coordinate grid to find the exact location P of the plane.
- (c) At what angle from the North direction (positive y-axis) is the plane flying, and how many miles will it take for it to reach city B?