

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

Answer all questions and show your work. Unsupported answers may receive *no credit*. You may not use a calculator on this quiz. Allow 15 minutes for the quiz.

1. (3 points) Find the terms  $a_2$ ,  $a_3$  and  $a_4$  for the sequence defined by  $a_1 = 3$  and  $a_n = 1 - a_{n-1}$ .

**Solution:**  $a_2 = 1 - a_1 = 1 - 3 = -2$ ,  $a_3 = 1 - a_2 = 1 - (-2) = 3$ ,  $a_4 = 1 - (-a_3) = 1 - 3 = -2$ . (1 point per answer, if an incorrect value  $a_n$  is used correctly, give credit for the subsequent terms)

2. (3 points) Determine if the following sequences are convergent or divergent and find the limits.

(a)  $a_n = 1 + 2^n$ .

(b)  $b_n = \frac{1}{3 + 2^{-n}}$

**Solution:** a) (1 point) The sequence  $a_n = 1 + 2^n$  diverges to  $\infty$  or is not convergent.  
b) (2 points) Since  $\lim_{n \rightarrow \infty} 2^{-n} = 0$ , we may use the limit laws to say that

$$\lim_{n \rightarrow \infty} \frac{1}{3 + 2^{-n}} = \frac{1}{3 + 0} = \frac{1}{3}.$$

3. (4 points) Find the sum of the series  $\sum_{n=2}^{\infty} 3^{-n}$ .

**Solution:** The first term is  $1/9$  and the ratio is  $1/3$ , thus the value of the sum is

$$(\text{first term}) \cdot \frac{1}{1 - (\text{ratio})} = \frac{1}{9} \cdot \frac{1}{1 - 1/3} = \frac{1}{9} \cdot \frac{3}{2} = 1/6.$$

Identify first term (1 point), identify ratio (1 point), value of sum (1 point), simplify (1 point).