

## §9.2: SEQUENCES

1.] Determine the limits of the following sequences:

a.)  $\left\{ \frac{3n^3 - 1}{2n^3 + 1} \right\}$

b.)  $\{ \ln(n^3 + 1) - \ln(3n^3 + 10n) \}$

c.)  $\left\{ \frac{(n+1)!}{n!} \right\}$

d.)  $\left\{ \left( 1 + \frac{2}{n} \right)^n \right\}$

- 2.] Consider the following Geometric sequences. Discuss the behavior of each and determine which sequences converge.

a.)  $\{0.75^n\}$

b.)  $\{(-0.75)^n\}$

c.)  $\{1.16^n\}$

d.)  $\{(-1.16)^n\}$

- 3.] Prove that the following sequence converges by showing that the sequence is bounded and monotonic:

$$a_n = ne^{-n}, \quad \text{for } n = 1, 2, 3, \dots$$

- 4.] Compare the growth rates of sequences to determine whether the following sequences converge.

a.)  $\left\{ \frac{\ln(n^{10})}{0.00001n} \right\}$

b.)  $\left\{ \frac{n^8 \ln(n)}{n^{8.001}} \right\}$

c.)  $\left\{ \frac{n!}{10^n} \right\}$