

1. Consider the function  $f(x) = \frac{\sqrt[3]{9-x^2}}{x^2\sqrt{x+2}}$ . State the domain in set and interval notation.
2. Consider a geometric sequence whose second term is  $a_2 = 1$  and whose seventh term is  $a_7 = -243$ . Find the function  $a_n$  that describes this sequence and find the 6th term of the sequence. What is  $\lim_{n \rightarrow \infty} a_n$ ?
3. Consider an arithmetic sequence whose third term is  $a_3 = -11$  and whose tenth term is  $a_{10} = -\frac{173}{3}$ . Find the function  $a_n$  that describes the sequence. What is  $\lim_{n \rightarrow \infty} a_n$ ?
4. Consider the sequence  $\frac{-1}{1}, \frac{1}{8}, \frac{-1}{27}, \frac{1}{64}, \dots$ 
  - (a) Prove the sequence is neither arithmetic nor geometric.
  - (b) Find  $a_n$  for the above sequence. Find the next two terms.
  - (c) Determine the limit of the above sequence. Explain your answer.
5. Use the limit laws to calculate

$$\lim_{n \rightarrow \infty} \frac{4n^3 + 2 + 6n}{4,000,000,000 + 7n^3 - 5n^2}$$

6. Find the domain of  $h(x) = \sqrt{3x+1} + \sqrt{5-x}$  and express with a number line and in interval notation.
7. For each sequence, match any and all terms from the following list that apply to that sequence.
 

(a) increasing	(e) bounded from below	(i) arithmetic
(b) decreasing	(f) unbounded	(j) geometric
(c) alternating	(g) convergent	
(d) bounded from above	(h) divergent	

  - i  $\frac{3}{2}, \frac{3}{4}, \frac{3}{6}, \frac{3}{8}, \frac{3}{10}, \dots$
  - ii  $a_n = 205 - 5n$
  - iii  $b_n = \left(\frac{3}{2}\right)^n$
  - iv  $3, -3, 1, -1\frac{1}{3}, \frac{-1}{3}, \frac{1}{9}, \frac{-1}{9}, \dots$

8. Consider the sequence  $b_n = \frac{2n + 3}{n}$ .

(a) Find the limit.

(b) Determine the value for which all subsequent terms of the sequence will be within  $\frac{1}{100}$  of the limit.

9. Suppose  $\lim_{n \rightarrow \infty} a_n = 5$  and  $\lim_{n \rightarrow \infty} b_n = -11$ . Use the limit laws for determine  $\lim_{n \rightarrow \infty} \left( \frac{a_n + b_n}{a_n - b_n} \right)$ .

What assumption must you make for these to apply?

10. Let

$$f(x) = -3x^2 + 5 \quad g(x) = \frac{x}{x - 4} \quad h(x) = \sqrt{x + 7}$$

(a) What is  $f(-2)$ ?

(b) What is  $h(9)$ ?

(c) What is  $(f \circ h)(-5)$ ?

(d) Find and simplify  $\frac{g(7 + h) - g(7)}{h}$ .

**An Ending Thought:** *Careful thinking and hard work will solve nearly all your problems. Try and see for yourself.*

– Ullery