SECTION 5.1: SEQUENCES

1. Things to Know by the end of this section:
   (a) what an infinite sequence is
   (b) how to read and use sequence notation
   (c) what it means to "Find a formula for the nth term" and how to find it
   (d) what it means for a sequence to converge or diverge
   (e) how to use the many different techniques for determining if a sequence converges or diverges
   (f) what $n!$ means
   (g) what the following terms mean when referencing a sequence: bounded, monotone, increasing, decreasing

2. An infinite sequence is

3. For each sequence below, write the first 5 terms and graph them.
   (a) $\left\{\frac{n+2}{2n}\right\}_{n=1}^{\infty}$

   (b) $a_n = 3\left(\frac{-1}{2}\right)^{n-1}$ for $n \geq 1$

   (c) $a_1 = 5$ and $a_n = 2 \cdot a_{n-1} + 1$

4. Find a formula for 3c.

5. Definition: The symbol $n!$ (or "n factorial") means

6. Find a formula for the sequence $a_1 = 1$ and $a_n = 3 \cdot a_{n-1}/n$

7. sequences and convergence

8. Find the limit of each of the following sequences or show that it diverges.

(a) $\left\{\pi + \dfrac{100}{n}\right\}$

(b) $\left\{\dfrac{100n^2 + \sqrt{n}}{n - 3n^2}\right\}$

(c) $\left\{\dfrac{n^2}{10^n}\right\}$

(d) $\left\{\left(1 + \dfrac{1}{n}\right)^n\right\}$

Now, go back to the examples 3abc. Find the limit of each or show that it diverges.

9. Definitions: The sequence $\{a_n\}$ is:

   (a) bounded if

   (b) increasing

   (c) decreasing

   (d) monotone

10. Monotone Convergence Theorem

11. Are the sequences below bounded? Monotone?

   (a) $a_n = \frac{(-1)^{n-1}}{3^n}$ for $n \geq 1$

   (b) $a_n = \frac{3^n}{n!}$ for $n \geq 1$