Math 253 GWS 1 - 8.1 Sequences Name:_____

1. Determine the first six elements of the given sequence. Does it appear as though the sequence is convergent or divergent?

   a. $a_n = \dfrac{n+1}{2^n}$

   b. $a_n = \dfrac{n^2+2n-1}{3n+2}$

2. Determine a formula for the general term a_n of the sequence, assuming that the pattern of the first few terms continues.

   a. $\left\{\dfrac{3}{4}, \dfrac{4}{9}, \dfrac{5}{16}, \dfrac{6}{25}, ...\right\}$

   b. $\{5, 1, 5, 1, 5, ...\}$

3. Determine whether the sequence converges or diverges. If it converges, find the limit.

   a. $a_n = \dfrac{(-1)^n n^3}{n+1}$

   b. $a_n = \sqrt{\dfrac{n+1}{9n+1}}$

c. $a_n = n\cos(n\pi)$

e. $a_n = \dfrac{(\ln(n))^2}{n}$

d. $a_n = \dfrac{\sin(2n)}{1+\sqrt{n}}$

f. $a_n = \dfrac{(-3)^n}{n!}$

4. Use a graph of the sequence to decide whether the sequence is convergent or divergent. If the sequence is convergent, guess the value of the limit from the graph and then prove your guess.

a. $a_n = 1 + \left(\frac{-2}{e}\right)^n$

b. $a_n = \frac{1 \cdot 3 \cdot 5 \cdot \ldots \cdot (2n-1)}{(2n)^n} = \frac{\prod_{i=1}^{n}(2i-1)}{(2n)^n}$

5. Determine the first 10 elements of the given sequence. Does it appear as though the sequence is convergent or divergent?

$a_1 = 1 \qquad a_{n+1} = \frac{1}{2}a_n + \frac{1}{4}$