172 Homework 9 Name: _____

1. Let $a_n = \dfrac{n}{2n-1}$ List the first 5 terms, then compute $\lim\limits_{n\to\infty} a_n$

2. Show $\lim\limits_{n\to\infty} \dfrac{\cos(n)}{\sqrt{n}} = 0$

3. For each of the following sequences, state whether they are increasing, decreasing, monotonic, bounded above, bounded below, bounded. If they are bounded above or below or both, give an upper and/or lower bound.

   (a) $a_n = (-1)^{n+1}$

   (b) $a_n = \dfrac{n}{n^2+1}$

   (c) $a_n = 2 + \dfrac{(-1)^n}{n}$

   (d) $a_n = \dfrac{n}{n+1}$

4. For the sequence defined by $a_1 = 2, a_{n+1} = \dfrac{1}{3 - a_n}$

   (a) List the first 5 terms.

   (b) Assuming the sequence has a limit, find the limit.

5. For the Fibonacci sequence

$$f_1 = f_2 = 1, f_n = f_{n-1} + f_{n-2}$$

let $a_n = \dfrac{f_{n+1}}{f_n}$

(a) List the first 5 terms of a_n

(b) Assuming the limit exists, find $\lim_{n\to\infty} a_n$