

## Math 102, Calculus II, Spring 2024, Sec. 3 &amp; 13, HTK

## Quiz 1, Tue., Feb. 13

Show all your work and name any tests you use.

1. Show that the sequence defined by  $a_1 = \frac{3}{2}$  and  $a_{n+1} = 3 - \frac{2}{a_n}$  is increasing and bounded above by 2. Deduce that  $\{a_n\}$  converges and find its limit.

Show that the sequence defined by  $a_1 = \frac{3}{2}$  and  $a_{n+1} = \frac{2}{3 - a_n}$  is decreasing and bounded below by 1. Deduce that  $\{a_n\}$  converges and find its limit.

Show that the sequence defined by  $a_1 = 2$  and  $a_{n+1} = 4 - \frac{3}{a_n}$  is increasing and bounded above by 3. Deduce that  $\{a_n\}$  converges and find its limit.

Show that the sequence defined by  $a_1 = 2$  and  $a_{n+1} = \frac{3}{4 - a_n}$  is decreasing and bounded below by 1. Deduce that  $\{a_n\}$  converges and find its limit.

2. Find the exact value of the sum  $\sum_{n=1}^{\infty} \frac{(-9)^{n-3}}{10^n}$ .

Find the exact value of the sum  $\sum_{n=1}^{\infty} \frac{(-7)^{n-5}}{8^n}$ .

Find the exact value of the sum  $\sum_{n=1}^{\infty} \frac{1}{(2n-1)(2n+1)}$ .

Find the exact value of the sum  $\sum_{n=1}^{\infty} \frac{1}{(3n-2)(3n+1)}$ .