

Calc II Problem sheet

Thursday, July 1

1. Let's define the sequence $\{a_n\}$ recursively by $a_0 = 2$ and

$$a_n = \frac{1}{2} \left(a_{n-1} + \frac{1}{a_{n-1}} \right), \text{ for } n > 0.$$

- (a) Compute the first three terms of the sequence.
(b) Find the limit of the sequence.
2. Write a careful sentence using the comparison test to show that

$$\sum \frac{\sin^2(n)}{n^2}$$

converges.

3. Determine whether each of the following series converges or diverges.

(a) $\sum \frac{n+1}{n}$.

(b) $\sum \frac{n+1}{n^2}$.

(c) $\sum \frac{n+1}{n^3}$.

Provide a rough justification.

4. Use the integral test to determine whether

$$\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^3}}$$

converges or diverges.

5. Compute the value of $\sum_{n=3}^{\infty} 2 \frac{3^{n+1}}{4^{n-1}}$.