

Due at the beginning of class on the day of Test 2

Direction: Solve the problems in this worksheet on separate sheets of paper. Write your solution neatly. Use standard size paper. Clearly label each problem, and include each problem in the correct order. No ragged edges. Staple multiple pages. At the top of the first page put your name, Math 2414, and the title of the worksheet. Show all work to justify your answer. Answer with insufficient work will receive no credit.

Problem 1: List the terms of a sequence

List the first five terms of the given sequence

1. $a_n = \frac{3n}{n+4}$

3. $a_n = \frac{(-1)^n n}{n! + 1}$

2. $a_n = \sin\left(\frac{n\pi}{2}\right)$

4. $a_1 = 6, a_{n+1} = \frac{1}{3}a_n^2$ for $n \geq 1$.

Problem 2: Find the nth term of a sequence

Find the formula for the **nth** term of the sequence

1. $\frac{1}{2}, -\frac{4}{3}, \frac{9}{4}, -\frac{16}{5}, \frac{25}{6}, \dots$

2. $\frac{1}{2 \cdot 3}, \frac{2}{3 \cdot 4}, \frac{3}{4 \cdot 5}, \frac{4}{5 \cdot 6}, \dots$

Problem 3: Find the limit of a sequence

Find the limit of the sequence

1. $a_n = 6 + \frac{2}{n^2}$

3. $a_n = \cos\left(\frac{2}{n}\right)$

2. $a_n = \frac{2n}{\sqrt{n^2+1}}$

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

Problem 4: Squeeze theorem

Use the Squeeze theorem to find the limit of the sequence:

1. $a_n = \frac{\sin(n)}{n}$

2. $a_n = \frac{\cos^2(n)}{2^n}$

Problem 5: Divergent sequences

Explain why the sequence diverges

1. $a_n = \frac{(n+1)!}{n!}$

3. $a_n = 1 + \frac{10^n}{9^n}$

2. $a_n = \sin\left(\frac{n\pi}{2}\right)$

4. $a_n = \frac{n!}{2^n}$

Problem 6: Monotonic sequence

Explain why the sequence is monotonic

1. $a_n = \frac{1}{2n+3}$

2. $a_n = n + \frac{1}{n}$