Name:



Show all work clearly and in order. Please box your answers.

SOLVE ONE OF THE FOLLOWING:

You must do all parts of a problem that you choose. Please indicate which problem you do NOT want me to grade by putting a GIANT X through it, otherwise I will grade the first problem worked on:

1. Determine whether the sequence converges, and if so find its limit.

(a)
$$\left\{\frac{\ln(n)}{4n}\right\}_{n=2}^{\infty}$$
 Let $f(x) = \frac{\ln(x)}{4x}$ (embed the sequence)

 $\lim_{x\to\infty} \frac{\ln(x)}{4x} \lim_{x\to\infty} \frac{\ln(x)}{4x} = \lim_{x\to\infty} \frac{1}{4x} = 0$.

Sequence converges

(b)
$$\left\{\frac{\sin(2n+1)}{n}\right\}_{n=1}^{\infty}$$
 Since $-1 \le \sin(2n+1) \le 1$ we can write $-\frac{1}{n} \le \frac{\sin(2n+1)}{n} \le \frac{1}{n}$

Also, Since $\lim_{n \to \infty} \frac{1}{n} = 0$

By squeeze thim

 $\lim_{n \to \infty} \frac{\sin(2n+1)}{n} = 0$. Sequence Converges

2. Show that the given sequence is strictly increasing or strictly decreasing.

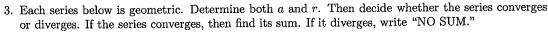
$$\frac{\left\{\frac{2n}{7n-1}\right\}_{n=1}^{\infty}}{\sqrt[3]{2n-1}} = \frac{14x-2-14x}{\sqrt[3]{2n-1}} = \frac{14x-2-14x}{\sqrt[3]{2n-1}} = \frac{-2}{\sqrt[3]{2n-1}} < 0$$
so the sequence is strictly observative observations.

SOLZ: Show any -an < O ... (work not shown)

SOL3: Show any < 1 ... (work not shown).

Confidence of the property

The sequence is strictly decreasing.



or diverges. If the series converges, if
$$a = \frac{1}{r}$$

$$r = \frac{-1/4}{4}$$

$$sum = \frac{-1/4}{4}$$

$$\sum_{k=1}^{\infty} \left(-\frac{1}{4}\right)^{k-1} \text{ is already in the proper}$$

$$A = 1 \qquad r = -\frac{1}{4}$$

$$A =$$

$$\sum_{k=1}^{\infty} \left(-\frac{1}{4}\right)^{k-1} = \left(-\frac{1}{4}\right)^{k} + \left(-\frac{1}{4}\right)^{k} + \left(-\frac{1}{4}\right)^{k} + \cdots$$

$$= \left(-\frac{1}{4}\right)^{k} + \left(-\frac{1}{4}\right)^{k} + \left(-\frac{1}{4}\right)^{k} + \cdots$$

$$= \left(-\frac{1}{4}\right)^{k} + \left(-\frac{1}{4}\right)^{k} + \cdots$$

$$= \left(-\frac{1}{4}\right)^{k}$$

(b)
$$\sum_{k=0}^{\infty} (-1)^k \frac{2^{3k}}{5^{k+1}}$$

$$a = \frac{1}{5}$$

$$r = \frac{-8}{5}$$

SOL1:
$$\frac{\sum_{k=0}^{\infty} (-1)^k \frac{2^{3k}}{5^{k+1}}}{5^{k+1}}$$
 Shats at 0, want pows of k.
$$= \frac{\cos}{5^{k}} (-1)^k (3^3)^k$$

$$=\frac{\sum_{k=0}^{k=0}\frac{2^{k}(3)^{k}}{2^{k}}$$

$$= \sum_{k=0}^{\infty} \left(\frac{1}{5}\right) \left(\frac{(-1)^{k}(8)^{k}}{5^{k}}\right)$$

$$\frac{5012!}{\sum_{k=0}^{\infty} (-1)^{k} \frac{7^{3k}}{5^{k+1}}} = \frac{(-1)^{2} \frac{2^{0}}{5^{1}} + \frac{(-1)^{2} \frac{2^{0}}{5^{2}}}{5^{2}} + \frac{(-1)^{2} \frac{2^{0}}{5^{3}}}{5^{3}} + \cdots$$

$$= \frac{1}{5} - \frac{2^{3}}{5^{2}} + \frac{2^{1}}{5^{3}} + \cdots$$

$$= \frac{1}{5} - \frac{2^{3}}{5^{3}} + \frac{2^{3}}{5^{3}} + \cdots$$

$$= \frac{1}{5} - \frac{2^{3}}{$$