Math 141 9.2: Series Worksheet

1. For the series, find the sequence of partial sums, S_0, S_1 ,..., and S_4. .

a. $1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\ldots$

b. $1-\frac{1}{2}+\frac{1}{4}-\frac{1}{8}+\ldots$

c. $1+\frac{2}{3}+\frac{4}{9}+\frac{8}{27}+\ldots$

d. $\sum_{n=0}^{\infty} 10\left(\frac{2}{5}\right)^n$

e. $\sum_{n=0}^{\infty} \frac{4^{n+1}}{5^n}$

f. $\sum_{n=0}^{\infty} \frac{5^{n-1}}{2^n}$

Then use the definition (test) for a geometric series to test the series above for convergence or divergence and if convergent find its sum.

2. Use the series, $\sum_{n=0}^{\infty}\left(\frac{1}{n+1}-\frac{1}{n+3}\right)$, to find the following.

The type of series:

S_4 :

S_n .

S , if convergent.

For problems, #3-#8,

Test the series for convergence or divergence, *if possible*. Name the test used, and support your conclusion. If convergent, find the <u>sum,</u> whenever possible.

3. $\sum_{n=0}^{\infty} \frac{(n+1)!}{n!}$

4. $\sum_{n=0}^{\infty} \frac{2n^2+1}{n^2+1}$

5.* $\sum_{n=1}^{\infty} \frac{n}{2n^2+1}$

6. $\sum_{n=1}^{\infty} \frac{(-1)^n n}{2n+1}$

7. $\sum_{n=1}^{\infty} \frac{2^n}{n^2+1}$

8. $\sum_{n=0}^{\infty} 8\left(-\frac{4}{5}\right)^n$

9. $\sum_{n=0}^{\infty} \frac{4^{n+1}}{5^n}$

10. $\sum_{n=1}^{\infty} \frac{2^n}{2^n+1}$

11. $\sum_{n=1}^{\infty}\left(\frac{1}{n^2+n}\right)$ *telescoping*

*show that we cannot make any conclusions YET!