Math 141 9.1 Sequences Worksheet

1. Write the first five terms of the sequences with n^{th} term.
Start your sequence with the given value of *n*.

a. $a_n = \frac{2^{n-1}}{n^2}, \quad n=1$

b. $a_n = 9\left(-\frac{2}{3}\right)^n, \quad n=0$ *geometric*

c. $a_n = \frac{n!}{2^n}, \quad n=0$

d. $a_n = \frac{2^{n+1}}{3^n}, \quad n=1$ *geometric*

e. $a_n = \frac{(-1)^n}{n(n-1)}, \quad n=2$

f. $a_n = \frac{x^n}{n!}, \quad n=0$

g. $a_n = \frac{(-1)^n x^{2n+1}}{(2n+1)!}, \quad n=0$

h. $a_n = \frac{x^{2n}}{(2n)!}, \quad n=0$

2. For the sequence, find the nth term, a_n. Start with the given value of *n*.

a. $\left\{\frac{1}{3}, \frac{1}{8}, \frac{1}{15}, \frac{1}{24}, \ldots\right\}, \quad n=2$

b. $\left\{\frac{1}{1}, \frac{1}{3}, \frac{1}{7}, \frac{1}{15}, \frac{1}{31}, \ldots\right\}, \quad n=1$

c. $\left\{\frac{1}{1}, \frac{2}{1}, \frac{5}{2}, \frac{10}{6}, \frac{17}{24}, \ldots\right\}, \quad n=0$

d. $\left\{-\frac{1}{1}, \frac{2}{1}, -\frac{4}{2}, \frac{8}{6}, -\frac{16}{24}, \ldots\right\}, \quad n=0$

e. $\left\{1, -\frac{3}{5}, \frac{9}{25}, -\frac{27}{125}, \frac{81}{625}, -\frac{243}{3125}, \ldots\right\}, \quad n=0$

3. Determine the convergence or divergence of the sequence.

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

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

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

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

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

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

g. $a_n = \frac{1+(-1)^n}{n^2}$

h. $a_n = \frac{\sin\left(\frac{(2n+1)\pi}{2}\right)}{n(n+1)}$

4. Find the first five terms of the recursive sequence given that

$$a_1 = 3$$
$$a_n = 2a_{n-1} + 1$$

recursive

5. Find the first five terms of the sequence with given nth term: $a_n = \frac{1}{n} - \frac{1}{n+1}, \quad n=1$ *telescoping*