Math 253 FWH 3 - Sequences and Series Introduction Name:________________________

1. Given the sequence $\left\{\frac{5}{1}, -\frac{10}{1}, \frac{17}{2}, -\frac{26}{6}, \frac{37}{24}, -\frac{50}{120}, ...\right\}$ determine a formula for the general term, a_n of the sequence, assuming that the pattern of the first few terms continues.

2. Determine whether the sequence converges or diverges. If it converges, find the limit.

a. $a_n = \dfrac{\sin(n) + 1}{n^3}$

b. $a_n = \dfrac{(-1)^{n-1} 2n(n+1)}{3n^2 + 3n - 4}$

c. $a_n = \dfrac{1 + 2^n}{3^n}$

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

e. $a_n = \dfrac{\ln(n+5)}{n^2 - 5}$

f. $a_n = \sqrt{\dfrac{2n+1}{3n-2}}$

3. Write the following sum in the compressed summation notation.

$$-\frac{3}{2} + \frac{5}{6} - \frac{9}{24} + \frac{17}{120} - \frac{33}{720} + ...$$

4. Write the sum in expanded form. Find at least 5 partial sums of the series. Does it appear that the series is convergent or divergent?

$$\sum_{n=1}^{\infty}(-1)^{n-1}\frac{2^n}{3^{n+1}}$$

5. Is there any chance that the following series converge?

(a) $\displaystyle\sum_{n=1}^{\infty}\frac{n(n-1)}{n^2-3n+1}$

(b) $\displaystyle\sum_{n=1}^{\infty}\frac{5}{2n-3}$

6. Telescope the following sum and use the limit of the partial sums to find the infinite sum.

$$\sum_{n=1}^{\infty}\frac{1}{n(n+1)}$$

7. Given the geometric series below, determine if they converge or not and, if they do, find their exact sum as a ratio of integers in reduced form.

   a. $\sum_{i=0}^{\infty} \frac{5}{3^i}$

   b. $\sqrt{3} - \frac{\sqrt{15}}{2} + \frac{\sqrt{75}}{4} - \frac{\sqrt{375}}{8} + ...$

8. Rewrite the number $5.237575757575... = 5.23\overline{75}$ as a ratio of integers.