HW 2, MA 1023
Due 1/31

In exercise 1, find a defining formula $a_n = f(n)$ for the sequence.

1.

$$1)\ -4, -3, -2, -1, 0, \cdots \qquad 2)\ \frac{1}{9}, -\frac{2}{12}, \frac{2^2}{15}, -\frac{2^3}{18}, \frac{2^4}{21}, \cdots$$

In exercise 2-6, determine the convergence or divergence of the sequences. If the sequence is convergent, find the limit.

2.

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

3.

$$(1)\ a_n = \frac{\sin^2(2n+1)}{n^2} \qquad (2)\ a_n = \frac{\cos(2n+3)}{2^n}$$

4.

$$(1)\ a_n = \frac{n + (-1)^{n+1}}{2n} \qquad (2)\ a_n = \frac{2n+1}{1 - 3\sqrt{n}}$$

5.

$$(1)\ a_n = \frac{\ln(2n+1)}{\sqrt{n}} \qquad (2)\ a_n = \cos(2\pi + \frac{1}{n^2})$$

6.

$$(1)\ a_n = \frac{(-4)^n}{n!} \qquad (2)\ a_n = 2 + (\frac{1}{2})^{2n}$$

7. Determine if the geometric series converges or diverges. If the series converges, find the value.

$$(1) \sum_{n=1}^{\infty} \frac{(-1)^n}{4^{n+1}} \qquad (2) \sum_{n=1}^{\infty} \frac{(-3)^n}{2^n}$$

8. Find a formula for the n-th partial sume of the series and use it to determine if the series converges or diverges. If a series converges, find its value.

$$(1) \sum_{n=1}^{\infty} \left(\frac{3}{n^2} - \frac{3}{(n+1)^2}\right) \qquad (2) \sum_{n=1}^{\infty} \left(\sqrt{n+4} - \sqrt{n+3}\right)$$