1.) Write each power series as an ordinary function.

a.) \[ \sum_{n=5}^{\infty} x^n \]

b.) \[ \sum_{n=0}^{\infty} 2^n x^n \]
c.) \[ \sum_{n=0}^{\infty} \frac{(-3)^{n+1} x^n}{5^{n-1}} \]
d.) \[ \sum_{n=4}^{\infty} n x^{n-1} \]
e.) \[ \sum_{n=0}^{\infty} n^2 x^{n-1} \]
f.) \[ \sum_{n=1}^{\infty} \frac{x^{n+3}}{n} \]
g.) \[ \sum_{n=1}^{\infty} \frac{(-1)^n x^n}{2^n n!} \]
h.) \[ \sum_{n=2}^{\infty} (-1)^n \left( \frac{2}{5} \right)^n \frac{x^{2n+1}}{2n + 1} \]

2.) Use any method to find the exact value of each of the following convergent series.

a.) \[ \sum_{n=0}^{\infty} 3 \left( \frac{-2}{3} \right)^n \]
b.) \[ \sum_{n=4}^{\infty} \frac{(-1)^{n+2}}{2^{n-3}} \]
c.) \[ \sum_{n=1}^{\infty} n^2 \left( \frac{1}{2} \right)^n \]
d.) \[ \sum_{n=0}^{\infty} n(n-1) \left( \frac{3}{4} \right)^{n+1} \]
e.) \[ \sum_{n=0}^{\infty} \frac{\ln 2^n}{n!} \]
f.) \[ \sum_{n=2}^{\infty} (-1)^n \frac{9^n}{(2n)!} \]

3.) Find the distance between the points \((3, -2, 4)\) and \((2, -6, -4)\).

4.) Find an equation of the sphere whose diameter has endpoints \((2, 4, -5)\) and \((0, -2, 4)\).

5.) Find the center and radius of the following sphere: \(x^2 + y^2 + z^2 = 2x - 4y + 6z - 5\)

6.) Determine a formula (and sketch the surface) for the set of all points \((x, y, z)\) in three-dimensional space which are
   a.) 4 units from the point \((2, -3, 0)\).
   b.) 3 units from the z-axis.
   c.) 1/2 unit from the x-axis.
   d.) 2 units from the plane \(y = 3\).
   e.) equidistant from the points \((3, 0, 0)\) and \((0, 0, 3)\).
   f.) equidistant from the planes \(z = 2\) and \(z = 6\).
   g.) equidistant from the planes \(x = 3\) and \(y = 2\).
   h.) equidistant from the point \((0, 0, 2)\) and the \(xy\)-plane.

7.) a.) If vector \(\vec{A} = (1, 0, -2)\), then what is the unit vector in the same direction as \(\vec{A}\)?
    b.) If vector \(\vec{A} = (a, b, c)\), and \(a, b,\) and \(c\) are not all zero, then what is the unit vector in the same direction as \(\vec{A}\)?

8.) Determine the vector \(\vec{B}\), which starts at point \((1, -1, 0)\) and ends at point \((-1, 2, 6)\). Find a vector of length 2 pointing in the opposite direction of \(\vec{B}\).

9.) Find two vectors of length 3 which are both perpendicular to
a.) vector $\mathbf{W} = 3\mathbf{i} + 4\mathbf{j}$.

b.) vector $\mathbf{W} = \mathbf{i} - 2\mathbf{j} + 2\mathbf{k}$.

10.) A sailboat starts at the origin (0, 0), then sails
   a.) 3 km NW, then turns and sails
   b.) 2 km 60° North of East, then turns and sails
   c.) 4 km SE, then turns and sails
   d.) 10 km 30° South of West, and stops. What are the sailboat’s coordinates now?

11.) Two strong wires of equal length are hung from two supports which are at the same height and 6 feet apart. Each wire is attached to the same point of a 200 pound weight. What is the force of tension (in pounds) on each wire if the wires are each
   a.) 5 feet long?
   b.) 20 feet long?
   c.) 3.1 feet long?
   d.) 3.01 feet long?

12.) You can swim at a constant speed of 5 mph. You wish to swim across a river 1 mile wide and land at a point directly across the river from where you start swimming. If the river flows at the constant rate of 3 mph, in what direction should you swim to accomplish this? How long will it take you to swim across the river?

*************** The following problem is for recreational purposes only. ***************

13.) A circus is witnessed by 120 people who have paid a total of $120. The women paid $5 each, the men paid $2 each, and the children paid 10 cents each. How many women and children went to the circus?