1.) Compute the arc length of the given curve on the indicated interval.
   a.) \( y = x^{5/4} \) for \( 0 \leq x \leq 1 \)
   b.) \( y = (1/6)x^3 + \frac{1}{2x} \) for \( 1 \leq x \leq 3 \)
   c.) \( x = (1/8)y^4 + \frac{1}{4y^2} \) for \( 1 \leq y \leq 2 \)

2.) Consider the graph of \( y = \sqrt{x} \) on the interval \( 0 \leq x \leq 1 \). Compute the area of the surface of revolution formed by revolving this graph about the \( x \)-axis.

3.) Consider the graph of \( x = (1/3)y^3 \) on the interval \( 0 \leq y \leq 3 \). Compute the area of the surface of revolution formed by revolving this graph about the \( y \)-axis.

4.) Consider the graph of \( y = (2/3)x^{3/2} \) on the interval \( 1 \leq x \leq 9 \). Compute the area of the surface of revolution formed by revolving this graph about the \( y \)-axis.

5.) Consider the graph of \( y = (2x - x^2)^{1/2} \) on the interval \( 0 \leq x \leq 2 \). Compute the area of the surface of revolution formed by revolving this graph about the \( x \)-axis.

6.) The graph of the equation \( x^{2/3} + y^{2/3} = 1 \) is revolved about the \( y \)-axis to form an astroid. Compute the surface area of the astroid.

7.) How much work is required to raise a 500 pound weight to a point 50 feet above the ground using a rope weighing 2 pounds per foot?

8.) (Hooke's Law) A spring is stretched 3 meters from its natural length by a force of 24 Newtons. If the force of the spring is proportional to the distance it is stretched, compute the work required to stretch the spring.
a.) 2 meters from its natural length.
b.) from 3 meters to 5 meters from its natural length.

9.) (not Hooke’s Law) The force required to stretch a spring \( x \) meters from its natural length is given by \( F(x) = 2\sqrt{x} \) Newtons. How much work is done stretching the spring 1/2 meter from its natural length?

10.) A tank in the shape of a right circular cone (vertex down) of height 10 feet and radius 5 feet is filled with water which weighs 62.4 pounds per cubic feet. How much work is required to pump all of the water to a drain pipe 15 feet above the top of the tank?

THE FOLLOWING PROBLEM IS FOR RECREATIONAL PURPOSES ONLY.

11.) Determine the exact value of the following expression: \( \sqrt{1 + \sqrt{1 + \sqrt{1 + \sqrt{1 + \ldots}}} \} \)