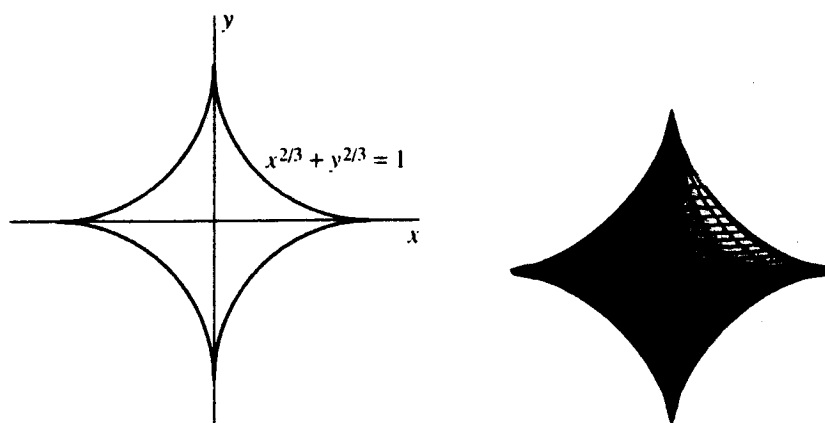


Math 21B
Vogler
Discussion Sheet 5

- 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 : $\sqrt{1 + \sqrt{1 + \sqrt{1 + \sqrt{1 + \sqrt{1 + \dots}}}}}$