

## Arc Length and Polar Coordinates

1. Draw the graph and setup the integral used to compute the arc length for the following equations

(a)  $x = \frac{1}{2}t, y = 2t^2$ , for  $0 < t < 2$ .

(b)  $x = \pi t, y = \sin(t)$ , for  $-1 < t < 1$ .

2. Compute the arc length for the following equations:

(a)  $(t^3 + 1, t^2 - 3)$ ,  $0 \leq t \leq 1$

(b)  $(\sin 3t, \cos 3t)$ ,  $0 \leq t \leq \pi/2$

3. Graph and convert to an equation in rectangular coordinates

(a)  $r = 7$

(b)  $r = \sin \theta$

4. Compute the arc length of 3(a) in three different ways:

(a) Using basic geometry knowledge

(b) Using the arc length formula in rectangular coordinates

(c) Using the arc length formula in polar coordinates

5. Do the following:

(a) Draw  $r = 1/2$  and  $r = \cos(3\theta)$

(b) Find the area of inside the "petals" and outside of circle.

(c) Find the area of inside the "petal" and inside the circle.

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