

# In class assignment 10-Polar Coordinates

Name: \_\_\_\_\_

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Directions: Work in groups to complete the following problems.

1. Convert the polar coordinates to Cartesian coordinates.

(a)  $(1, \frac{2\pi}{3})$

(b)  $(2\sqrt{3}, -\frac{\pi}{6})$

2. Convert the Cartesian coordinates to polar coordinates.

(a)  $(\sqrt{6}, -\sqrt{2})$

(b)  $(-1, 0)$

3. Find the area between the two spirals  $r = \theta$  and  $r = 2\theta$  for  $0 \leq \theta \leq 2\pi$ .

4. Suppose Nirchi's starts selling lemicon shaped pizzas. They have two offers, a pizza whose radius is  $r_1 = 3 + 2\cos(\theta)$  inches for \$10 and a pizza of radius  $r_2 = 5 + 3\cos(\theta)$  for \$20. Use polar coordinates to find the surface area of each pizza. Which is the better deal? How much more pizza do you get with the second offer?

5. Find the slope of the curve  $r = 3\cos(2\theta)$  at  $\theta = \frac{\pi}{2}$ .

6. Set up an integral to find the arclength of one petal of the rose  $r = 3\sin(2\theta)$  for  $0 \leq \theta \leq \frac{\pi}{2}$ . Do not evaluate.

7. For what value of  $a$  is the area enclosed by  $r = \theta$ ,  $\theta = 0$ , and  $\theta = a$  equal to 1?

8. Find all points of intersection between  $r_1 = 1 + 2\sin(\theta)$  and  $r_2 = 4\sin(\theta)$ . Then find the area of the region bounded by  $r_2$  but outside the region bounded by  $r_1$ .