

Math 231/199: Calculus 2 Merit

Worksheet 20

November 27, 2007

(1) Convert the following points from rectangular to polar coordinates:
 $(-1, 1)$, $(0, 3)$, $(3, 4)$, $(-2, -\sqrt{5})$.

(2) Convert the following points from polar to rectangular coordinates:
 $(2, \pi)$, $(1, 0)$, $(10, \pi/6)$, $(3, 2\pi/3)$.

(3) Sketch the following polar curves:

$$r = 3$$

$$r = 2 \sin(\theta)$$

$$r = 4 \cos(\theta)$$

$$r = 3 + 2 \cos(\theta)$$

$$r = 2 + 3 \cos(\theta)$$

$$r = 3 + 3 \cos(\theta)$$

$$r = \sin(2\theta)$$

(4) Convert the following equations from rectangular to polar coordinates:

$$x = 9$$

$$x + y = 1$$

$$3x^2 - 4y^2 = 7$$

$$(x - 1)^2 + y^2 = 0 \quad (\text{simplify your answer})$$

(5) Convert the following equations from polar to rectangular coordinates:

$$r = 3$$

$$r = 2 \sin(\theta)$$

$$r = 4 \cos(\theta)$$

$$r(r - 4) = 0 \quad (\text{sketch this graph})$$

(6) Graph the following pairs of polar equations superimposed. Then determine all points where $(r_1, \theta) = (r_2, \theta)$.

$$r_1 = 2 \cos(\theta) \quad r_2 = 2 \sin(\theta)$$

$$r_1 = 1 \quad r_2 = 2 \sin(\theta)$$

$$r_1 = -1 \quad r_2 = \sin(\theta) + 1$$

(7) Do the points where $(r_1, \theta) = (r_2, \theta)$ account for all the points of intersections of the pairs of graphs from the last question? Why or why not? Can you give a complete description of where two polar curves will intersect?