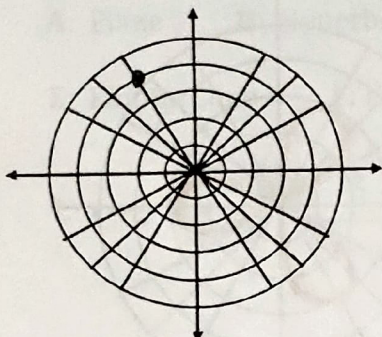


1. Consider the point.  $\left(-4, -\frac{\pi}{3}\right)$

a) Plot the point.



b) Find 3 different polar coordinates for this point in the domain  $-2\pi \leq \theta \leq 2\pi$   
Give all answers in radians. (1 pt each)

\_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

c) Convert the point to rectangular coordinates. (2 points)

\_\_\_\_\_

2. Show that the polar curve  $r = 4\cos\theta - 6\sin\theta$  is a circle by changing it to rectangular. Then find the radius of the circle.

Rectangular equation: (3 pts)

radius (1 pt)

\_\_\_\_\_

\_\_\_\_\_

3. Convert the hyperbola  $r = \frac{5}{2\cos\theta + 3\sin\theta}$  into rectangular.

Rectangular equation: (3 pts)

\_\_\_\_\_

4. Convert the equation:  $(x^2 + y^2)^2 = 32xy$  into polar form of the three curves we learned yesterday (polar rose, limacon or lemniscate).

<sup>Polar</sup>  
Rectangular equation: (3 pts)

Name of Curve: (1 pt)

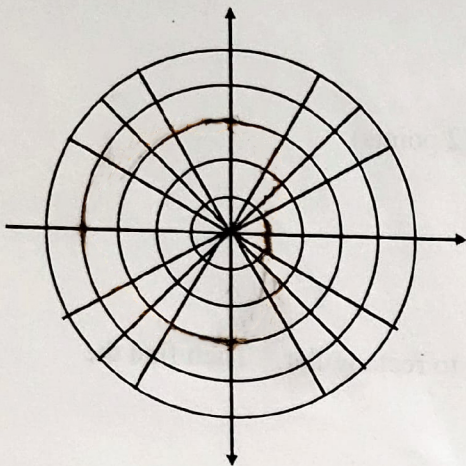
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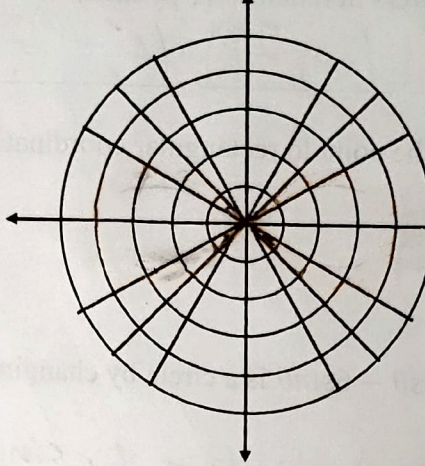


5. Graph each equation (2 pts each)

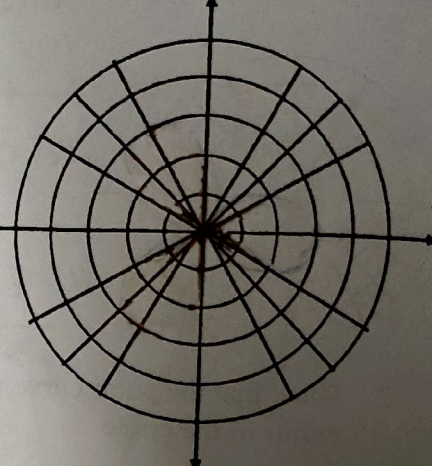
a)  $r = 3 - 2\sin\theta$



b)  $r^2 = 16\cos 2\theta$



c)  $r = 3\cos 3\theta$

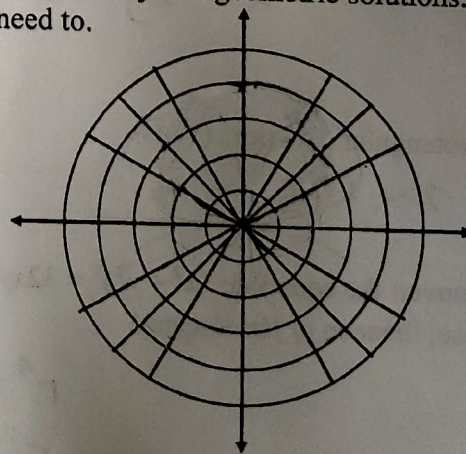


6. A) Write the equation of an inner loop limaçon with a max r-value of 8 on the x-axis.

Equation \_\_\_\_\_ (3 pts)

B) For your equation above, name an angle at which it passes through the pole (origin). [2]

7. The system of equations  $r = 4\sin\theta$  and  $r = 2 + 2\sin\theta$  has exactly two geometric solutions. Find both of them. Feel free to graph if you'd like but you don't need to.



Solutions: \_\_\_\_\_ [3]