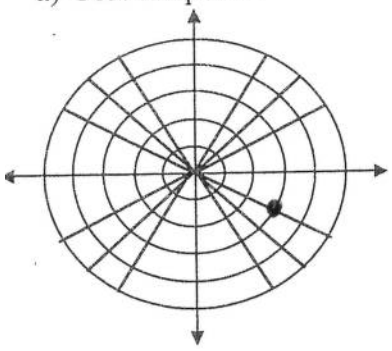
Analysis H – Deggeller / Hahn
Polar and 3D - Quiz 1 (30 points)

26/30

Name _____
Per F

1. Consider the point $\left(-3, \frac{-7\pi}{6}\right)$.

a) Plot the point.



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

$(-3, \frac{5\pi}{6})$, $(3, -\frac{\pi}{6})$, $(3, \frac{11\pi}{6})$

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

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

2. Convert each equation to rectangular form, and then graph.

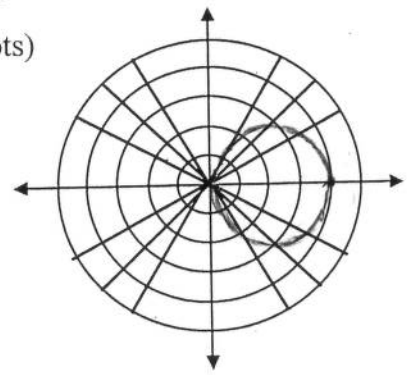
a) $r = 4\cos\theta$

$r^2 = 4r\cos\theta$
$x^2 + y^2 = 4x$
$(x-2)^2 + y^2 = 4$

Rectangular equation: (3 pts)

$(x-2)^2 + y^2 = 4$

Graph: (2 pts)



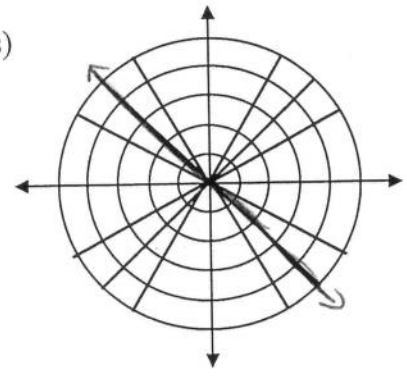
b) $\theta = -\frac{\pi}{4}$

$\cos\theta = \frac{\sqrt{2}}{2}$
$r\cos\theta$

Rectangular equation: (3 pts)

$y = -x$

Graph: (2 pts)



3. Convert the equation: $y = \pm\sqrt{\frac{1}{x^2} - x^2}$ into polar form. Write your answer in the form "r = ". (4 pts)

$y^2 = \frac{1}{x^2} - x^2$

$r^2 = \frac{1}{x^2}$

$r = \frac{1}{x}$

$r = \frac{1}{r\cos\theta}$

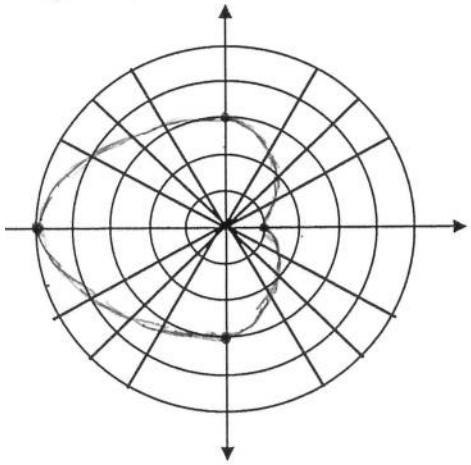
$r^2 = \frac{1}{\cos\theta}$

$r = \sqrt{\frac{1}{\cos\theta}}$

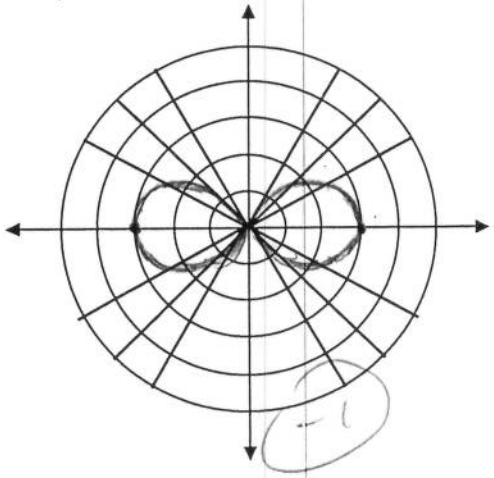
-0

4. Graph each equation (2 pts each)

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



b) $r^2 = 3\sin 2\theta$



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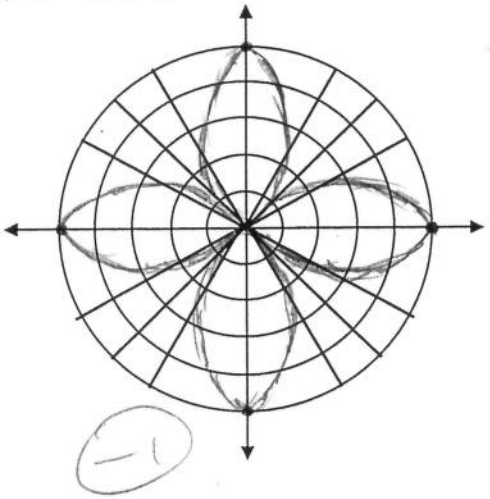
c) $r = 5\sin 4\theta$



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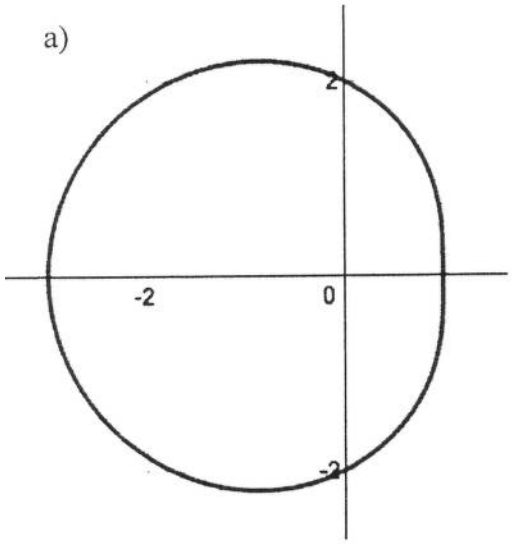
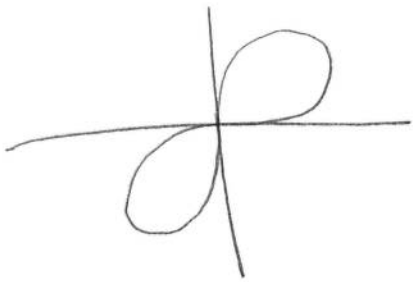
5. Write the equation of each in polar form. (2 pts each)

a)



Equation: $r = 2 - \cos\theta$

c) A lemniscate that is not symmetric around the x axis, whose petals have a length of 12.



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Equation: $r^2 = 12\sin 2\theta$

8. Verify algebraically that $r = 3 - 4\sin\theta$ has $\theta = \frac{\pi}{2}$ symmetry. (4 pts)

$(r, \pi - \theta)$

$r = 3 - 4\sin\theta$

$r = 3 - 4\sin(\pi - \theta)$

$r = 3 - 4(\sin\pi\cos\theta - \cos\pi\sin\theta)$

$r = 3 - 4\sin\theta$ ✓

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