Analysis H – Hahn /Tantod
Unit 3, Quiz 2 – 2021/22
[25 points]

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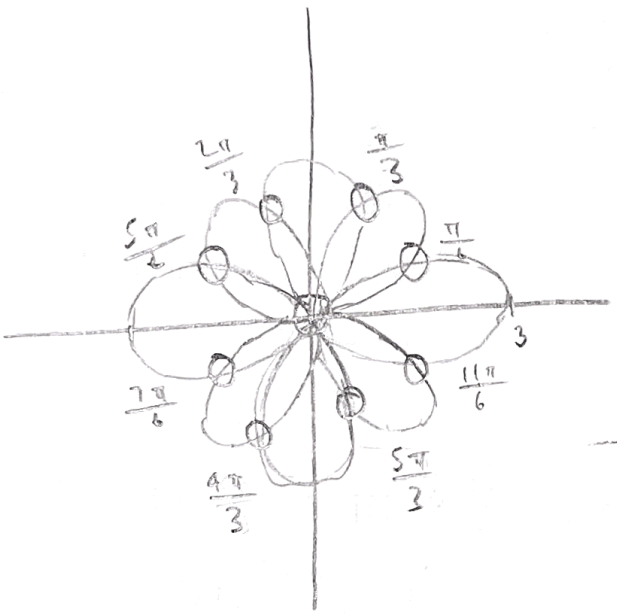
I'm Lost in Space: Chris Lee
Per: 3

1. Find the points of intersection for the polar graphs $r = \sqrt{3}sin2\theta$ and $r = 3cos2\theta$, for $0 \le \theta \le 2\pi$. Please show all your work including the graphs of the two equations. (6 pts)



$\sqrt{3}\sin 2\theta = 3\cos 2\theta$

$\frac{\sqrt{3}}{3}\tan 2\theta = 1$

$\tan 2\theta = \sqrt{3}$ $\quad$ $\tan 2\theta = -\sqrt{3}$

$2\theta = \frac{\pi}{3}, \frac{4\pi}{3}, \frac{7\pi}{3}, \frac{10\pi}{3}$ $\quad$ $2\theta = \frac{2\pi}{3}, \frac{5\pi}{3}, \frac{8\pi}{3}, \frac{11\pi}{3}$

$\theta = \frac{\pi}{6}, \frac{2\pi}{3}, \frac{7\pi}{6}, \frac{5\pi}{3}, \frac{\pi}{3}, \frac{5\pi}{6}, \frac{4\pi}{3}, \frac{11\pi}{6}$

$\left(\frac{3}{2}, \frac{\pi}{6}\right)\left(-\frac{3}{2}, \frac{2\pi}{3}\right)\left(\frac{3}{2}, \frac{7\pi}{6}\right)\left(-\frac{3}{2}, \frac{5\pi}{3}\right)\left(-\frac{3}{2}, \frac{\pi}{3}\right)$

$\left(\frac{3}{2}, \frac{5\pi}{6}\right)\left(-\frac{3}{2}, \frac{4\pi}{3}\right)\left(\frac{3}{2}, \frac{11\pi}{6}\right)(0,0)$

II. Matching: Match each quadric surface below to its corresponding name. [1 pts each]

A: Plane **B**: Hyperboloid of 1 Sheet **C**: Hyperboloid of 2 Sheets **D**: Ellipsoid

E: Elliptic Cone **F**: Hyperbolic Paraboloid (saddle) **G**: Elliptic Paraboloid **H**: None of the Above

2. $y^2 + 9z^2 = 9$ H

3. $\frac{x^2}{4} - \frac{y^2}{9} + \frac{z^2}{6} = 1$ B

4. $x^2 + y^2 - 24 = 4z$ G

$\frac{y^2}{9} + \frac{z^2}{1} = 1$

5. $y^2 = 4x^2 + 16z^2$ E

6. $5x - 3y + 2 = 30$ A

7. $x = 4 - 5y^2 - 9z^2$ H

$+4 = +x + 5y^2 + 9z^2$

$5y^2 + 9z^2 = -x + 4$

$x^2 + y^2 + z^2 = 1$ ellipsoid

$x^2 + y^2 - z^2 = 1$ 1 sheet

$x^2 + y^2 - z^2 = 0$ cone

$x^2 + y^2 - z^2 = -1$ 2 sheets

$x^2 + y^2 - z = 0$ ellip para

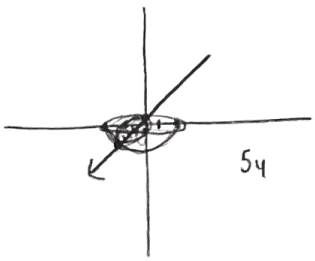
$x^2 - y^2 - z = 0$ hyper para

$5y = -5y^2$

$5y^2 = 4$

$y^2 = \frac{4}{5}$

$y = \pm\frac{2}{\sqrt{5}}$



$9z^2 = 4$

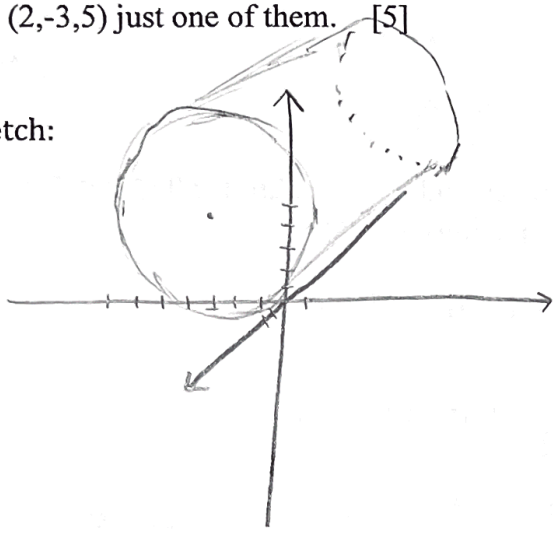
$z^2 = \frac{4}{9}$

$z = \pm\frac{2}{3}$

$5y^2 + 9z^2 + x = 4$

8. Sketch a picture of, and write the equation for a circular cylinder with center: (2,-3,5), and radius = 4 that extends forever in the x direction. Note that this cylinder actually has infinite centers, so consider (2,-3,5) just one of them. [5]

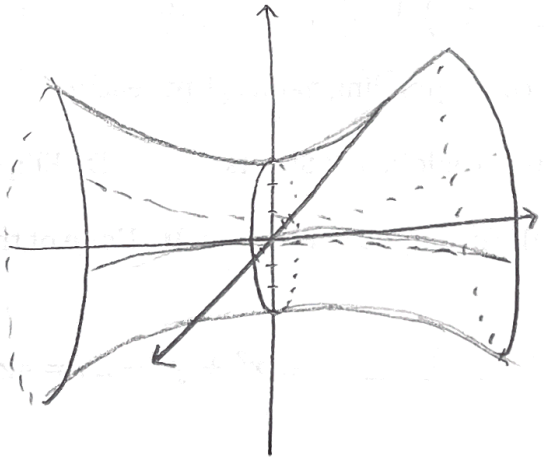
Sketch:



Equation: $(y+3)^2+(z-5)^2=16$

9. Sketch a picture of, and name the following curve $\frac{x^2}{4}+\frac{z^2}{9}=\frac{y^2}{12}+1$ [5]

Sketch:

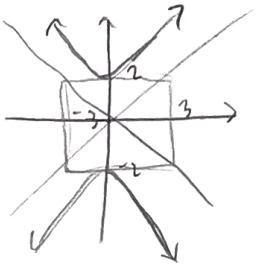


$\frac{x^2}{4}+\frac{z^2}{9}-\frac{y^2}{12}=1$

Name: hyperboloid of 1 sheet

10

10. The quadric surface $9y^2 = 4x^2 + 36$ is a hyperbolic cylinder. Draw a sketch with the intercepts. Show all your work. [3]



$9y^2 - 4x^2 = 36$

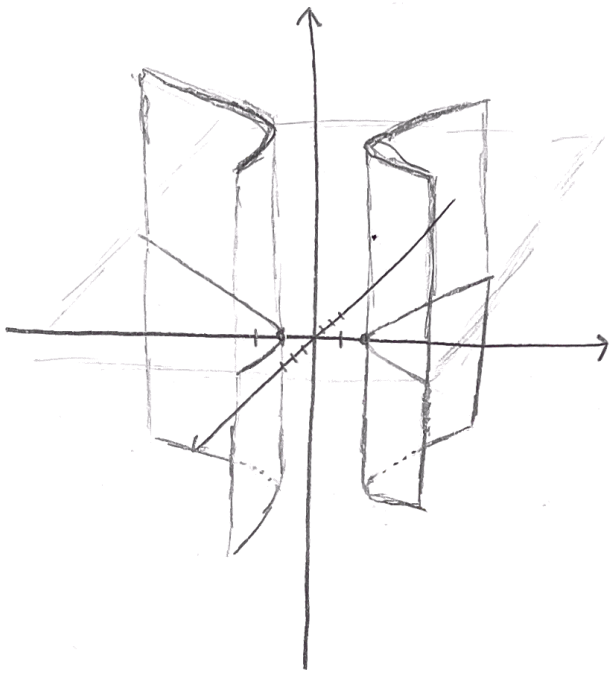
$\frac{y^2}{4} - \frac{x^2}{9} = 1$

$y^2 = 4$

$y = \pm 2$

$x^2 = -9$

$x = \pm 3i$



$(0, 2, 0)$

$(0, -2, 0)$

doesn't touch x or z axis

/-0