Analysis H – Deggeller / Hahn
Unit 3, Quiz 2 – 2017
[36 points]

~~36~~ ~~42~~ 37/42

Space Cowboy: Hannah Kim
Per: ___

1. Identify each 3D shape by name, using proper mathematical vocabulary. [2 pts each]

a) $\frac{y^2}{4} = 5 - \frac{x^2}{7}$
~~ellipsoid~~ -2

b) $y^2 + x^2 = z - 4$
elliptic paraboloid ✓

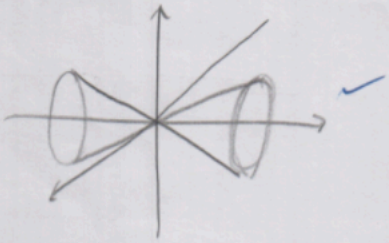
c) $-z^2 + 4x^2 - y^2 = 0$
elliptic cone ✓

d) $2 + \frac{y^2}{8} = z + \frac{x^2}{8}$
saddle ✓

e) $\frac{x^2}{11} + z^2 = y^2 - 6$
hyperboloid of two sheets ✓

f) $y^2 + x^2 = -4$
not possible ✓

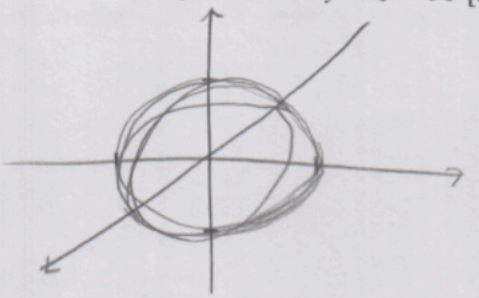
2. a) Sketch the shape defined by the equation $x^2 + z^2 = y^2$ [3 pts]



b) What shape(s) is/are formed by the intersection of the shape in part (a) with the plane y = 8? [1 pt]
a circle ✓

c) What shape(s) is/are formed by the intersection of the shape in part (a) with the plane x = 3? [1 pt]
a hyperbola ✓

d) Sketch the shape defined by the equation $x^2 + y^2 + z^2 = 30$ [3 pts]



← It's an ellipsoid I swear ✓ ☺

e) What shape(s) is/are formed by the intersection of the shape in part (a) with the shape in part (d)? [1]
2 circles ✓

3. a) Write an equation of a Hyperboloid of 2 Sheets which opens up along the z-axis, has a vertex at (0, 0, 6). [3 pts]

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

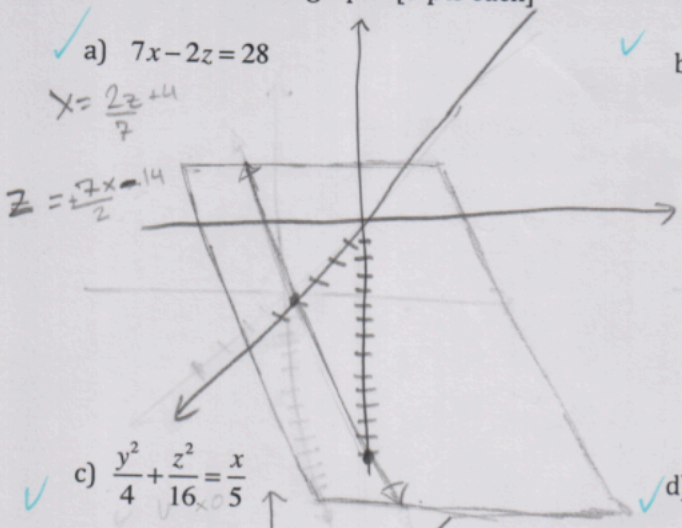
$(z-5)^2 - x^2 - y^2 = 1$

-1

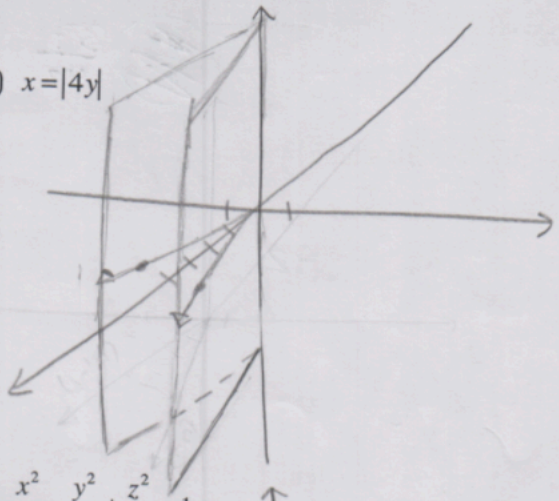
b) Why are there infinite answers to question 3a above?
There are infinite answers because there are an infinite number of combinations of (x, y, z) that fit the equation $(z-5)^2 - x^2 - y^2 = 1$. ✓

4. Sketch each 3D graph. [3 pts each]

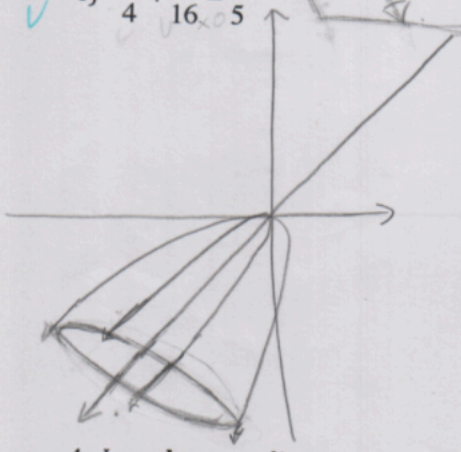
a) $7x-2z=28$



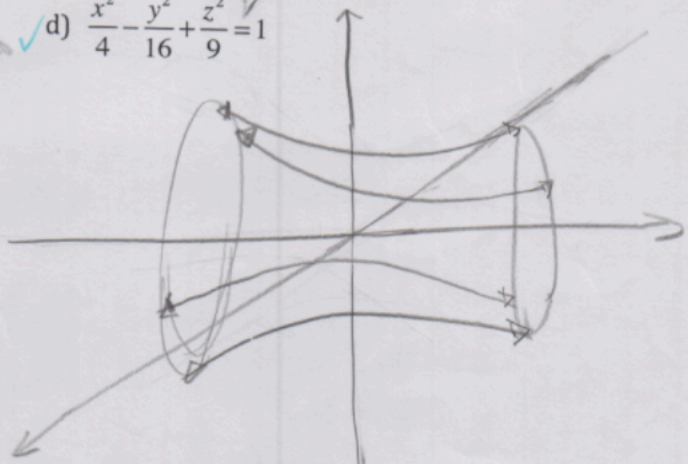
b) $x=|4y|$



c) $\frac{y^2}{4}+\frac{z^2}{16}=\frac{x}{5}$



d) $\frac{x^2}{4}-\frac{y^2}{16}+\frac{z^2}{9}=1$



4. In **polar** coordinates, a certain conic section is defined by the equation $r=\frac{12}{2-\cos\theta}$.

ellipse

(the general equations for polar conics are $r=\frac{ep}{1\pm e\sin\theta}$ and $r=\frac{ep}{1\pm e\cos\theta}$)

Make a sketch of the shape.
Accurately graph and label any vertices, foci, and directrices (multiples of each, if they exist).
[5 pts]