

1. Identify each of the quadric surfaces by name. (1 pts each) Be specific!

a) $x^2 + 5x + y^2 - y = 12$

a) circular cylinder

b) $y^2 - z^2 = x + 3$

b) hyperbolic paraboloid

c) $(x-2)^2 + (y+4)^2 + 4(z-10)^2 = 4$

c) ellipsoid

d) $3z^2 + 2y^2 = x$

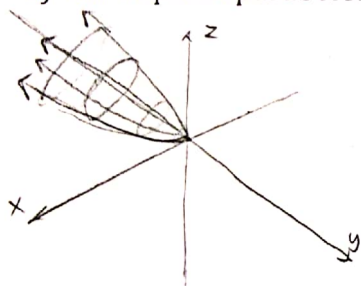
d) elliptic paraboloid

e) $xy = 15$

e) hyperbolic cylinder

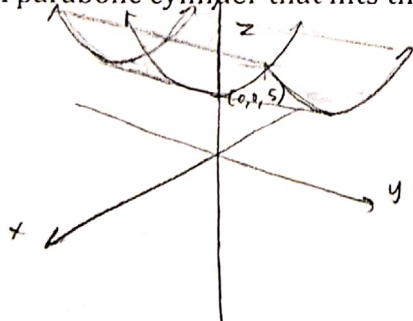
2. For each of the following figures, (1) make a sketch, and (2), write an equation.

a) An elliptical paraboloid that hits the origin and opens along the negative y-axis. (4 pts)



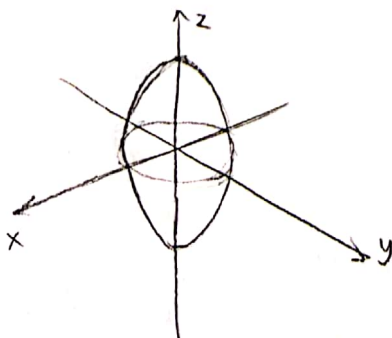
$$-y = x^2 + z^2$$

b) A parabolic cylinder that hits the points (0, 0, 5) is parallel to the y-axis. (4 pts)



$$x^2 + 5 = z$$

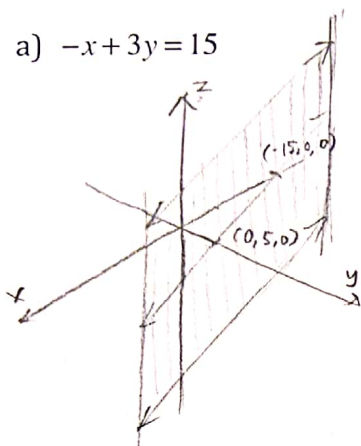
c) An ellipsoid that has a circle as its xy trace, and is longest in the z-direction. (4 pts)



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

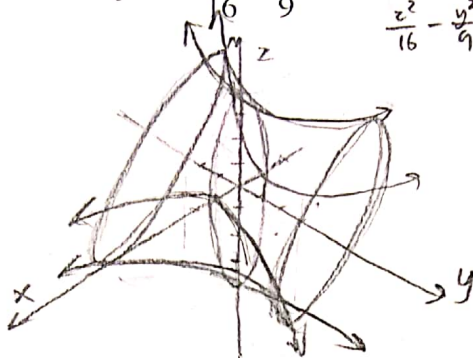
3. Sketch each of the following 3D surfaces. Then identify it by its correct name. (3 pts)

a) $-x + 3y = 15$



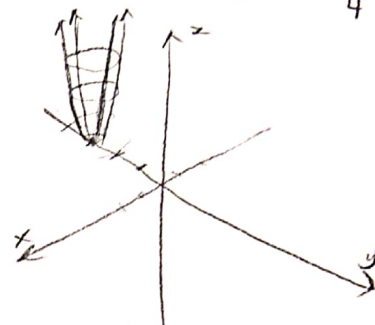
name: plane

b) $x^2 + \frac{z^2}{6} - \frac{y^2}{9} = 1$



name: hyperboloid of one sheet

c) $\frac{x^2}{4} + (y+3)^2 = \frac{z}{10}$



name: elliptic paraboloid

4. The **intersection** of the graph $x^2 + z^2 = y^2$ (double cone, extending in the y-direction) and some plane results in a hyperbola. What is a possible equation of the plane? (2 pts)

$$y = 3x + 10$$

5. The **intersection** of the graph $x^2 + z^2 = y^2$ and some plane results in a circle. What is a possible equation of the plane? (2 pts)

$$y = k$$

$k \neq 0$

6. The **intersection** of the graph $x^2 + z^2 = y^2$ and some plane results in a parabola. What is a possible equation of the plane? (2 pts)

$$y = x + k$$

$k \neq 0$

↳ plane parabola to sides of cone