

## Worksheet - Week 5

1. For the following surfaces, find  $xy$ -,  $yz$ -, and  $xz$ -traces, and sketch a surface.

(a)  $x^2 - \frac{y^2}{4} = 1$

(b)  $\frac{x^2}{4} + y^2 - \frac{z^2}{9} = 4$

(c)  $x^2 + y^2 = z^2$

2. Sketch the surface defined by  $z = -\sqrt{x^2 + y^2}$ . What is different from the surface defined by  $z^2 = x^2 + y^2$ ?

3. Graph several level curves of the following functions using the given window. Label at least two level curves with their  $z$ -values.

(a)  $z = \sqrt{4 - x^2 - y^2}$ ;  $[-3, 3] \times [-3, 3]$

(b)  $z = xy$ ;  $[-2, 2] \times [-2, 2]$

4. Calculate the limit of multivariable functions or show that the limit does not exist.

(a)  $\lim_{(x,y) \rightarrow (0,2)} \frac{4x^2 - 4xy + y^2}{2x - y}$

(b)  $\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 + 3y^4}{x - y^4}$

(c)  $\lim_{(x,y,z) \rightarrow (-1,1,1)} \frac{xz + 2x + y^2z + 2y^2}{x + y^2}$