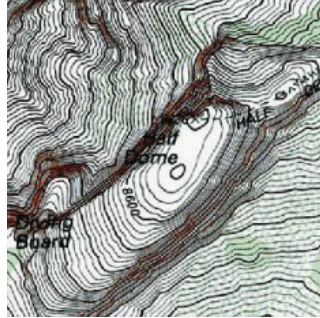


3D Functions

While working in a group make sure you:

- Expect to make mistakes but be sure to reflect/learn from them!
- Are civil and are aware of your impact on others.
- Assume and engage with the strongest argument while assuming best intent.

Definition: A *function of two variables* is a rule that assigns to each ordered pair of real numbers (x, y) in a set D , a unique real number denoted by $f(x, y)$.



1. Determine which of the following define z as a function of x and y . If a function, determine its domain.

$$z = \ln(xy)$$

$$z^2 + 4 = x^2 + \frac{y^3}{2}$$

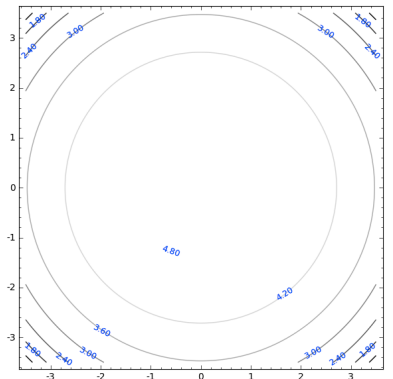
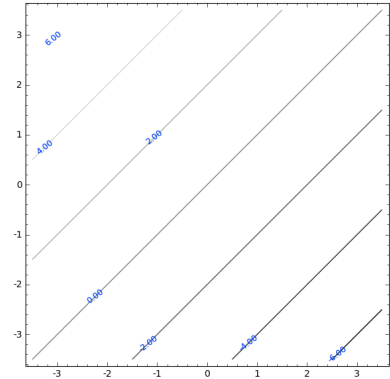
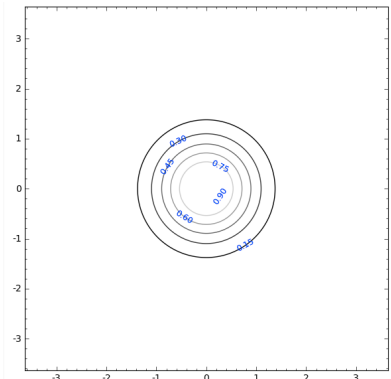
$$zx = \frac{x+y}{y}$$

2. For each of the following, match the function with its level curves.

$$f(x, y) = y - x$$

$$g(x, y) = \sqrt{25 - x^2 - y^2}$$

$$h(x, y) = e^{-x^2 - y^2}$$



Beginning of Calculus in 3D

3. Find (if possible):

$$\lim_{(x,y) \rightarrow (2,1)} \frac{x-2}{x^2y-4y}$$

$$\lim_{(x,y) \rightarrow (0,0)} \frac{1}{x^2+y^2}$$

4. Where is $g(x, y)$ continuous where $g(x, y) = \frac{2}{y-x^2}$

5. Let $f(x, y) = \frac{y}{x}$. Find $\lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x, y) - f(x, y)}{\Delta x}$

