Recitation Week 1

1. Consider the points $A(0, 1, 0)$ and $B(0, 3, 2)$. Find the plane that passes through A and that is perpendicular to $\vec{AB}$. Then, find the distance from the point $C(1, 3, 3)$ to the plane.

2. Find and sketch the domain of the following functions, and indicate if it is open, closed, bounded or unbounded:

   - $f(x, y) = \dfrac{(x-1)(y+2)}{(y-x)(y-x^3)}$,

   - $f(x, y) = \dfrac{\sin(xy)}{x^2 + y^2 - 25}$,

   - $f(x, y) = \sqrt{(x^2 - 4)(y^2 - 9)}$.

3. Find and sketch the level curves $f(x, y) = c$ of the following functions:

   - $f(x, y) = 4x^2 + y^2$,
   - $f(x, y) = 1 - |y|$,
   - $f(x, y) = 1 - |x| - |y|$.

4. Find and sketch the level curve of $f(x, y) = \dfrac{2y - x}{x + y + 1}$ that passes through the point $(-1, 1)$.

5. Find and sketch the domain of f. Then find an equation for the level curve or surface of the function f passing through the given point:

   - $f(x, y, z) = \displaystyle\sum_{n=0}^{\infty} \dfrac{(x+y)^n}{n! z^n}$, $(\ln 4, \ln 9, 2)$,

   - $f(x, y) = \displaystyle\int_x^y \dfrac{d\theta}{\sqrt{1 - \theta^2}}$, $(0, 1)$.