1. Let us consider $y$ defined implicitly by the equation $xe^y = 1$.

(a) (5 points) Find the tangent lines of the curve at $(1,0)$ and $(\frac{1}{2},1)$.

Solution:

(b) (5 points) Find the angle between these lines.

Solution:
2. Let \( z = uv + v^2 \), where \( u = x + y \) and \( v = xy \).

(a) (5 points) Find \( \frac{\partial z}{\partial x} \) and \( \frac{\partial z}{\partial y} \).

Solution:

(b) (5 points) Find the maximal value of \( D_u(1,1) \) and the direction where it reaches.

Solution:
3. Let $f(x, y) = \cos(x) + \sin(y)$.

(a) (5 points) Find the tangent planes at $(\pi, \pi, -1)$ and $(\frac{\pi}{2}, \frac{\pi}{2}, 1)$.

Solution:

(b) (5 points) Find the angle between the planes.

Solution: