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 \( \left( \frac{\pi}{2}, \frac{\pi}{2}, 1 \right) \).

   Solution:

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

   Solution: