Partial Derivatives and the Tangent Plane

Background

Using the commands from the first two labs complete the following exercises.

Exercises

1. Find the equation of the plane tangent to the surface $z = \dfrac{x\sin(x+y)}{\sqrt{4+x^2+y^2}}$ at the point $(-1, 2)$. Plot both the tangent plane and the surface on the same graph over the intervals $-3 \leq x \leq 1$ and $0 \leq y \leq 4$. Be sure to rotate the graph to see that the plane is tangent to the surface.

2. Given the function:
$$z = \frac{y}{3} + 5 + (x + sin(x)) * \frac{y-1}{3}$$
Find the critical point (including its z-value). Then graph the equation and decide what kind of critical point you found.

3. Using implicit methods find where the given ellipsoid has horizontal tangents.
$$\frac{(x-\frac{1}{3})^2}{9} + \frac{(y+14)^2}{2} + z^2 = 1$$
Then graph the ellipsoid along with the planes over the intervals $-3 \leq x \leq 4$ and $-16 \leq y \leq -12$ and $-1.2 \leq z \leq 1.2$.