Tangent Planes

Consider the surface $x^2 + y^2 + z^2 = 25$. We wish to find the equation of the tangent to this plane at point $P(1, 2, \sqrt{20})$.

a) Sketch this surface. Explain why it looks the way it does.
   
   Answer: This surface is a sphere of radius 5, centered at the origin.

b) Label the approximate position of point $P$ on your drawing.
   
   Answer: See above figure.

c) Solve the equation for $z$, then use the linearization formula to determine the plane tangent to the plane at point $P$.
   
   Answer: $x + 2y + \sqrt{20}z = 25$

d) Optional: use the gradient method to determine the plane tangent to the plane at point $P$.
   
   Answer: $x + 2y + \sqrt{20}z = 25$