GRADIENTS AND TANGENT PLANES

(1-6) For each of the following functions, use a gradient vector to find the equation of the tangent plane at the point $(1,1, f(1,1))$.

1. $z = f(x,y) = x^3y^2$

2. $z = f(x,y) = \sin(x^3y^2)$

3. $z = f(x,y) = \sqrt{x^3y^2}$

4. $z = f(x,y) = \sec(x^3y^2)$

5. $z = f(x,y) = \tan(x^3y^2)$

6. $z = f(x,y) = \sin^{-1}(x^3y^2)$

7. Find the equation of the tangent plane to the surface $x^2 + y^2 + z^2 = 9$ at the point $P = (0,0,3)$.

8. Find the equation of the tangent plane to the surface $x^2 + y^2 - z^2 = 0$ at the point $P = (3,4,5)$.