# CROSS-SECTIONS AND TANGENTS

1. Let $z = f(x,y) = x^2 + xy + y^2$. Find parametric equations for the cross-section of $z = f(x,y) = x^2 + xy + y^2$ with the plane $x = 1$.

2. Let $z = f(x,y) = x^2 + xy + y^2$, and let $P = (1,2,7)$. Find parametric equations for the line that is tangent to $z = f(x,y) = x^2 + xy + y^2$ at the point $P = (1,2,7)$ and that lies in the plane $x = 1$.

3. Let $z = f(x,y) = x^2 + xy + y^2$. Find parametric equations for the cross-section of $z = f(x,y) = x^2 + xy + y^2$ with the plane $y = 2$.

4. Let $z = f(x,y) = x^2 + xy + y^2$, and let $P = (1,2,7)$. Find parametric equations for the line that is tangent to $z = f(x,y) = x^2 + xy + y^2$ at the point $P = (1,2,7)$ and that lies in the plane $y = 2$.

5. Find an equation for the plane that is tangent to $z = f(x,y) = x^2 + xy + y^2$ at the point $P = (1,2,7)$. Write your answer in the form $z = Ax + By + C$.