

## 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  $z = Ax + By + C$ .