

1. Find an equation for the tangent plane to the graph of  $f(x, y) = \cos(\pi x^2 y)$  at the point  $(-1, 1/3, 1/2)$ .
2. Use a tangent plane to approximate  $f(x, y) = \sqrt{x^2 + y}$  at the point  $(2.99, -5.02)$ .
3. Find all critical points of  $f(x, y) = x^3 - 6xy + y^2$ . Determine whether each critical point is a relative maximum, relative minimum, or saddle point.