Let $g(x, y) = x^2 - y^2$ and consider the surface $z = g(x, y)$

(a) Sketch the level curves for $z = 2, 1, 0, -1, -2$ on the same set of axes

(b) Sketch the trace in the xz-plane

(c) Sketch the graph $z = g(x, y)$ in three dimensions

(d) Verify by using Mathematica to generate a contour plot and a plot of the surface in $\mathbb{R}^3$

Let $f(x, y) = xy$ and consider the surface $z = f(x, y)$

(a) Sketch the level curves for $z = 2, 1, 0, -1, -2$ on the same set of axes

(b) Sketch the trace in the xz-plane

(c) Sketch the graph $z = f(x, y)$ in three dimensions

(d) Verify by using Mathematica to generate a contour plot and a plot of the surface in $\mathbb{R}^3$

1. Let $h(x, y) = -x \, y \, e^{-x^2 - y^2}$

   (a) Create a contour plot of $z = h(x, y)$ in Mathematica.
       What do you think the surface looks like?

   (b) Create a plot of the surface in $\mathbb{R}^3$

2. Repeat for $h(x, y) = \sin(x) + \cos(y)$

3. Repeat for $h(x, y) = \sin(x^2 - y^2)$