Let $g(x, y) = x^2 - 4x + y^2 - 8y + xy + 20$.

1. Find $g_x(3, 4)$ and $g_y(3, 4)$.

2. On the same set of axes, plot $g(x, y)$ and the paths on the surface corresponding to $x = 3$ and $y = 4$. Do your answers from #1 agree with this?

3. Find the absolute minimum value of $g(x, y)$. Verify your answer using a contour plot.