1. Find the directional derivative of $f(x, y) = y^2 \ln(x)$ in the direction $\mathbf{v} = \mathbf{i} - \mathbf{j}$ at the point $(1, 4)$.

2. Given that $P = (2, 1, -1)$ and $Q = (-1, 2, 0)$, find the directional derivative of $f(x, y, z)$ at P in the direction from P to Q.

$$f(x, y, z) = \frac{y}{x + z}$$

3. Sketch the level curve of $f(x, y) = y/x^2$ that passes through $P = (-2, 2)$ and draw the gradient vector at P.