1. Complete the sentences:

   (a) A vector field $\mathbf{F}$ is called conservative if

   (b) We can check if a vector field is conservative by checking independence of

   (c) We can check if a vector field is conservative by using partial derivatives to see if

2. Determine whether or not $\mathbf{F}$ is a conservative vector field. If it is, find a function $f$ such that $\mathbf{F} = \nabla f$.

   (a) $\mathbf{F}(x, y) = (y^2 - 2x)i + 2xyj$

   (b) $\mathbf{F}(x, y) = (ye^x + \sin y)i + (e^x + x \cos y)j$
3. Show that the line integral

\[ \int_C \sin y \, dx + (x \cos y - \sin y) \, dy \]

is independent of path and evaluate the integral where \( C \) is any path from \((1, 0)\) to \((2, 1)\).