

Question 1

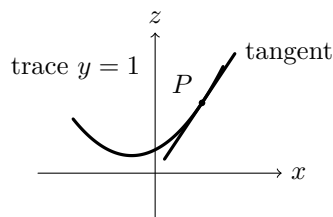
For $f(x, y) = x^2 + 3xy - y^2$ at $P = (1, 2, 3)$:

Tasks

1. Find f_x, f_y at $(1, 2)$.
2. Interpret them as trace slopes.
3. Write both trace tangent lines.

Question 1 – Solution

Strategy. Hold one input fixed at a time.



Step 1: Rates $f_x = 2x + 3y$, $f_y = 3x - 2y$, hence $\boxed{f_x(1, 2) = 8}$ and $\boxed{f_y(1, 2) = -1}$.

Step 2: Meaning With $y = 2$, height rises 8 units per x unit; with $x = 1$, it falls 1 unit per y unit.

Step 3: Lines $\boxed{y = 2, z - 3 = 8(x - 1)}$ and $\boxed{x = 1, z - 3 = -(y - 2)}$.