A : Let $f(x, y) = (y^2, x + y)$, $g : \mathbb{R}^2 \to \mathbb{R}$ a function such that $\nabla g = (\sin(x^2), \cos(xy))$. Let $h = g \circ f$ be the composition of the two functions.

1. Find $Jh(2, 3)$.
2. If $h(2, 3) = 4$, find the plane tangent to the graph of h at $(2, 3)$.

B : Let $f(x, y) = x^2y^3$.

1. Find $Jf(2, 3)$.
2. In what direction is f increasing most rapidly at $(2, 3)$?
3. Find the equation to the plane tangent to graph of f at $(2, 3, 72)$.

C : Let $f(x, y) = e^y \sin y$.

1. Find $D_{\mathbf{u}}f(\mathbf{a})$ for $\mathbf{a} = (\pi/3, 0)$ and $\mathbf{u}$ parallel to $(3, -1)$.
2. In what direction does f increase most rapidly at that point?
3. Find the line tangent to $f(x, y) = \sqrt{3}/2$ at $\mathbf{a}$.

D : What polynomials can you add to or subtract from $f(x, y)$ without affecting the value of $\nabla f(2, 3)$ or $Hf(2, 3)$?