

[Submitting HW Tips](#)**HW #5**

- 1** Let $f : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ and $g : \mathbb{R}^2 \rightarrow \mathbb{R}^3$ be differentiable functions defined by

$$f(x, y) = (3y - x^2, x^2 + y^2) \quad \text{and} \quad g(x, y) = (x^2 + y, x - y, y^2),$$

compute $D(g \circ f)$ at the point $(x, y) = (1, 0)$.

- 2** Show that the ellipsoid $6x^2 + y^2 + 6y + z^2 = 15$ and the surface $z = x^2e^y - 4$ are tangent at their point of intersection $(1, 0, -3)$.

- 3** **Section 3.1** (Page 157): #10, 25.

- 4** Show that $e^x \ln(1 + y) \approx y + xy - \frac{y^2}{2}$, for small values of x and y (i.e., for (x, y) close to $(x_0, y_0) = (0, 0)$).

- 5** **Section 3.3** (Page 182): #4, 17.