Section 5: Midterm Review

---

1. Suppose you are given a function $f : \mathbb{R}^n \to \mathbb{R}^m$. Here's a heuristic for representing its derivative matrix.

2. To erase all ambiguity, remember the chain rule formula,

$$D(f \circ g)(x) = Df(g(x)) \circ Dg(x)$$

One easy way to "remember it" is to just recall the 1-dimensional analogue...

$$(f \circ g)'(x) = f'(\underline{g(x)})g'(\underline{x})$$

where the underline designates the argument.

Find the partial derivatives of $F(x, y) = f(x, g(x), h(x, y))$.

3. **Distance from a point to a plane** Given a point $Q = (x_1, y_1, z_1) \in \mathbb{R}^{\not{4}}$ and a plane $\vec{n} \cdot (x - x_0) = 0$ in $\mathbb{R}^{\not{4}}$, give a formula for the shortest distance from the point Q to the plane. Generalize this for planes and points living in R^n.