Discovery Exercise for Optimization and the Gradient

Figure 1 shows three points on a plot of a function $f(x, y)$. At point A, $\partial f/\partial x$ is positive and $\partial f/\partial y = 0$.

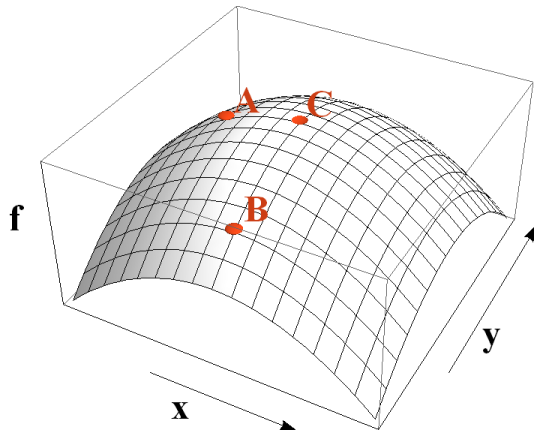

Figure 1

1. At point B, is $\partial f/\partial x$ positive, negative, or zero? What about $\partial f/\partial y$?

2. Point C is a local maximum of f. At that point are $\partial f/\partial x$ and $\partial f/\partial y$ positive, negative, or zero?

3. For a smooth one variable function $f(x)$ a local maximum or minimum always occurs when $df/dx = 0$. Based on your answers above, how would you generalize that rule to a two-variable function $f(x, y)$?