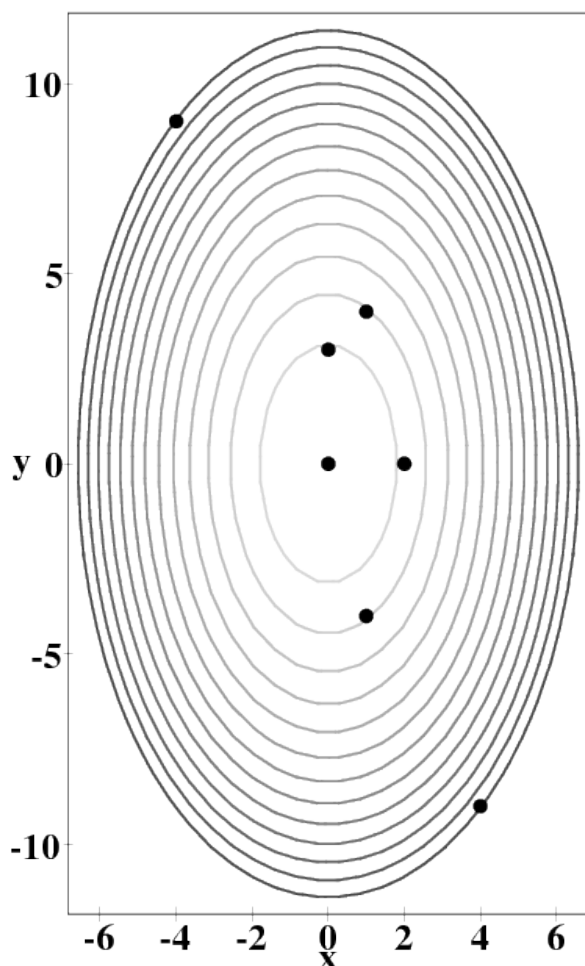There is a hill in this classroom. The top of the hill is in the middle of the room at the ceiling. This topo map below describes the hill in the room. You are standing at some point on the topo map. Use your right arm to point in the direction of the gradient.

Solution

- The height of the hill is only a function of two variables x and y describing a location on the topo map. Therefore, the gradient has only two components. It does not have an upward pointing $\hat{z}$ component. Your arm should be horizontal.

- Do NOT point toward the center of the hill. The gradient is a local quantity, i.e. it depends only on the slope at infinitesimally nearby points. The location of the top of the hill is irrelevant

to the gradient.

- Take a few minutes to think about how these statements change when the function is a function of three variables (e.g. the electrostatic potential $V(x, y, z)$), instead of two variables.