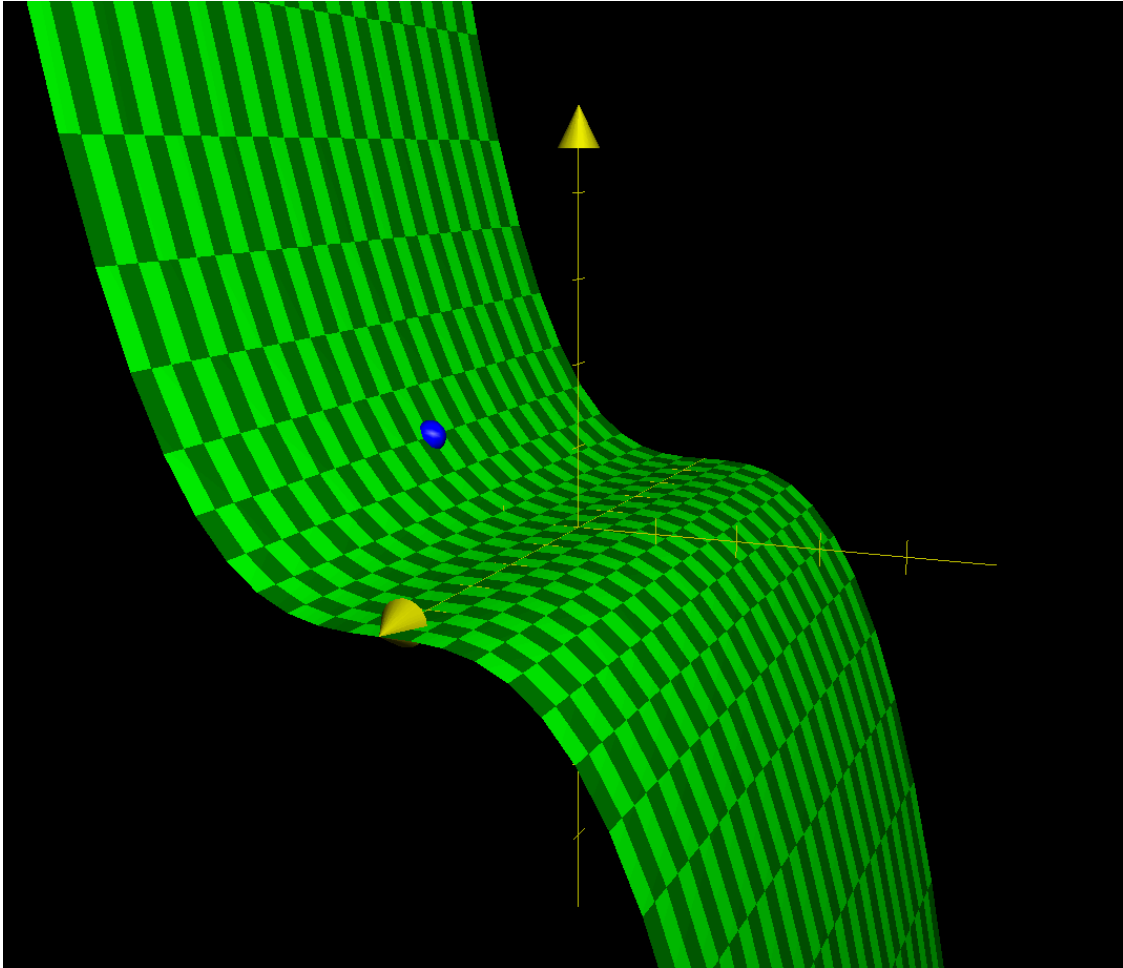


One possible design for one side of the roof would be a simple cubic function; that:

$$f(x, y) = \frac{1}{8}x^3 \{0 \leq x \leq 4, -5 \leq y \leq 5\} \quad (1)$$



1 | Slope in Middle

The "middle" of the roof, therefore, is the location $(2, 0)$, as indicated by the blue dot above.

Standing in the middle, and facing the "ridge" $(+x)$ direction, we could calculate the slope of the roof.

The vector facing the ridge of the roof, to the positive x direction, is represented by

$$\begin{bmatrix} 1 \\ 0 \end{bmatrix} \quad (2)$$

the gradient of this function is represented by:

$$\begin{bmatrix} \frac{3}{8}x^2 \\ 0 \end{bmatrix} \quad (3)$$

Therefore, at the center point as indicated, the gradient is:

$$\begin{bmatrix} 6 \\ 0 \end{bmatrix} \quad (4)$$

Computing the dot product of the direction and the gradient as found, we arrive that — at the center — the slope is:

$$\begin{bmatrix} 1 \\ 0 \end{bmatrix} \cdot \begin{bmatrix} 6 \\ 0 \end{bmatrix} = 6 \quad (5)$$

Therefore, the slope as indicated is $6 \approx 80.5^\circ$.

2 | Facing the Peak

We first determine a vector that originates from the center of the roof, and facing towards one of the ridges