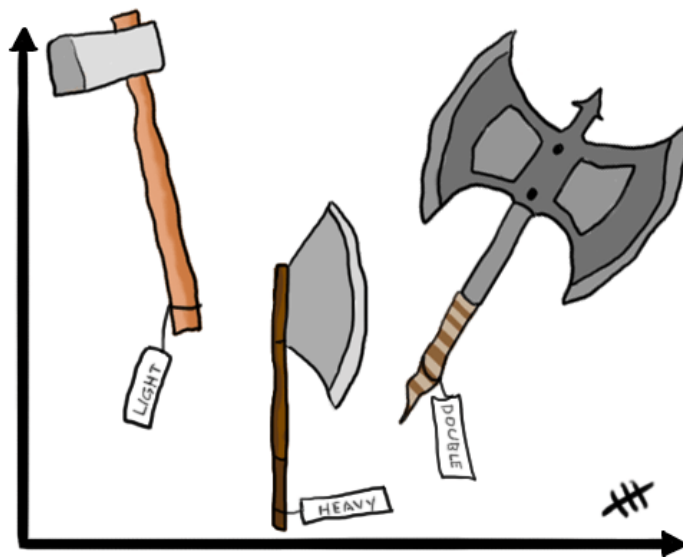


Homework 37: multivariable functions

Print and attach your *Mathematica* work; label each part with the associated problem and part numbers to make it easier for the grader to find your work.

- (1) Plot the function $z(x, y) = x^3 + 1$ by hand. Label your axes (as in the plural of *axis*, not the plural of *ax*). [Hint: start with a 2D plot, then go to 3D.]

Always label your axes



- (2) Consider the function $f(x, y) = x^2 + (y - 1)^2$.
- On a single graph, draw (by hand) the slices with x fixed at $x = -1, 0,$ and 1 . Label the axes and graphs appropriately (same for part (b) below).
 - On a single graph, draw (by hand) the slices with y fixed at $y = -1, 0,$ and 1 .
 - Plot the graph of $f(x, y)$ on *Mathematica* using both `ContourPlot` and `Plot3D`. Change the `ViewPoint` to get different views of the plot. Explain how your hand-drawn graphs agree with your *Mathematica*-drawn plots.
- (3) Consider a vibrating guitar string. The displacement of the string from its resting position is given by

$$g(x, t) = \cos 2t \sin x$$

where $0 \leq t \leq \pi$ is time in milliseconds and $0 \leq x \leq \pi$ is the distance from the end of the string. Do all of the steps below using *Mathematica* to come to an understanding of the shape of the graph.

- Plot, on a single `Plot`, the slices when $x = 0, \pi/4,$ and $\pi/2$. Label the slices by hand or use *Mathematica*'s drawing tools (same for part (b) below).
- Plot, on a single `Plot`, the slices when $t = 0, \pi/2,$ and π .
- Plot with `ContourPlot` and `Plot3D`.