(1) (1 point) Solve the following inequalities in $\mathbb{R}$:

$$\frac{x-2}{2x-8} \geq 1, \quad \log_{\frac{1}{3}}(x^2 - 3x + 2) \geq 0, \quad \frac{x+2}{x+3} > \frac{2x+3}{x+6}.$$

(2) (1 point) Solve the following in $\mathbb{R}$:

$$\sin 2x = \sin x, \quad 2xe^x = e^x, \quad 5x^2 - 8 = x^2 - x, \quad \log(x^2 + 1) = 2\log(3 - x).$$
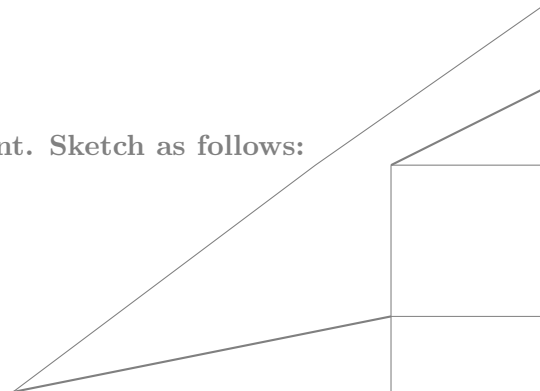
(3) (3 points) Compute the height of a drop.
Imagine you are a skier/snowboarder and you want to jump a cliff. You are h meters tall. When you are d meters away from the cliff, you see a stone l meters away from you under an angle α. Moreover, the slope is α_1 and α_2 over and under the drop, respectively. (Some rounding applies.)
Check your solution for $\alpha = \frac{\pi}{4}$, $\alpha_1 = 0$, $\alpha_2 = 0$, $l = 10\ m$, $h = 2\ m$, $d = 1\ m$.
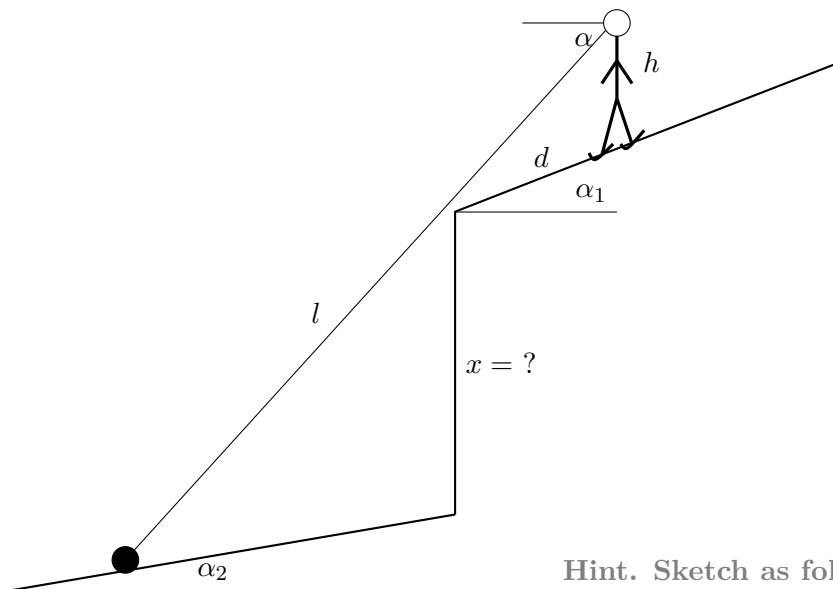
(4) (2 points) The following function are given:

$$f(x) = 3x^2 - x - 7 \tag{1}$$

$$f(x) = \left(\frac{7}{5}\right)^x - \frac{1}{2}x^3 \tag{2}$$

$$f(x) = 3\sin(x) + \cos(10x)\frac{1}{3}\sin(x) \tag{3}$$

$$f(x) = \left|\left|\left||x| - 1\right| - 1\right| - 1\right| \tag{4}$$

$$f(x) = \frac{1}{x} \tag{5}$$

$$f(x) = \log|x - 1| \tag{6}$$

Implement the method `plot_function(fct, x_min, x_max, step_size)` so that it can be used for visualization of the functions. Choose well the x-range. Determine the properties (domain, monotonicity, increasing, decreasing of the function, discontinuities,...) of the given functions.
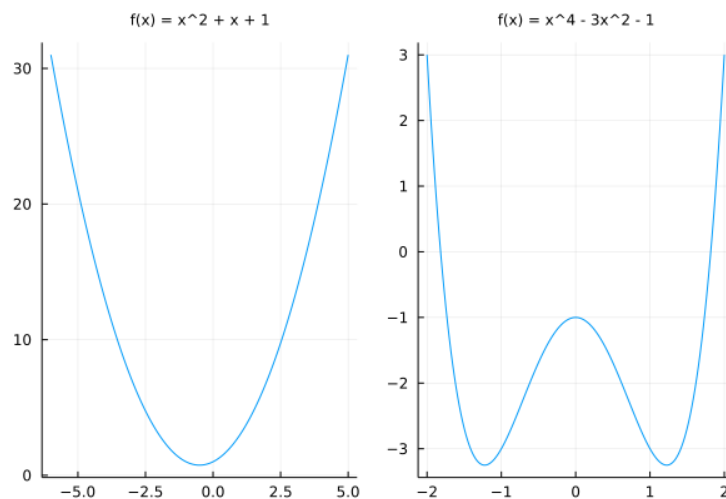

Figure 1: Plots of example functions.