

ASSIGNMENT 2

Manipulating functions

Reading: §0.2–0.5 in Smith-Minton

Exercise 2.1. Consider the quadratic function $f(t) = -4(t - 5)(t - 7)$.

- Draw a sketch of the graph of $f(t)$
- What manipulations (shift, stretch, etc.) does one need to do to the ‘standard’ quadratic $f = t^2$ in order to obtain this function?

Exercise 2.2. Repeat the previous exercise for $f(t) = 8(t - 2)(t + 4)$.

Exercise 2.3. In this exercise you explore variations on the function $f(x) = \frac{1}{x}$.

- (1) Draw a sketch of the graph of the function $f(x) = \frac{1}{x}$. Where is the vertical asymptote? Where is the horizontal asymptote?
- (2) Draw a sketch of the shifted function $f(x) = \frac{1}{x-4}$. Where are the asymptotes?
- (3) Draw a sketch of the function $f(x) = \frac{1}{x} - 4$. Where are the asymptotes?
- (4) Draw a sketch of the function $\frac{5}{x-3} + 10$. Where are the asymptotes?

Exercise 2.4. Draw a sketch of the graph of the following functions:

- (1) $f(t) = 2t + \sin(t)$
- (2) $f(t) = 2t \sin(t)$
- (3) $f(t) = t^2 + 4 + \frac{1}{10} \sin(t)$
- (4) $f(t) = (t^2 + 4) \sin(t)$

Exercise 2.5. Here we explore the absolute value function $f(t) = |t|$.

- (1) Draw a sketch of the graph of $f(t)$.
- (2) Write down a formula for the absolute value function in the form $f(t) = \begin{cases} ? \\ ? \end{cases}$
- (3) Let $v(t)$ be the velocity function corresponding to $f(t) = |t|$. Draw a sketch of $v(t)$ and write down a formula for $v(t)$.

Exercise 2.6. Draw a sketch of the graph of the functions $f(t) = |t| \sin(t)$ and $f(t) = \frac{|t|}{t}$.