1 Questions to be handed in for project 2: Functions in Julia

Read about this here.

- Write a function that describes a line with slope 2 going through the point $(1, 3)$. What is the value of $f(10)$, $f(-10)$?

- Write a function that computes

$$f(x) = 4x^2 - 3x - 7 - \frac{1}{x}$$

Use it to find the values of $f(1)$, $f(2)$, and $f(3)$.

- Write a function that computes:

$$f(t) = A\sin(Bt - C) + D$$

where $A = 3.1$, $B = 2\pi/365$, $C = 1.35$, and $D = 12.12$.

This function models the amount of daylight in Boston when t records the day of the year. How much daylight is there for $t = 1$, $t = 365/2$, $t = 35$?

- Person A starts at the origin and moves west at 60 MPH. Person B starts 200 miles north of the origin and moves south at 70 MPH. Write a function that computes the distance between the two people as a function of t in minutes.

(The (x, y) position of person A is $(60 \cdot t/60), 0)$ and the (x, y) position of person B is $(0, 200 - 70 \cdot t/60))$

Compute the distance at $t = 0$, $t = 30$ and $t = 120$ using a function. (You might start by defining the x and y distances with the following, then using the distance formula as a function of t.)

```
x(t) = 60t/60 - 0
y(t) = 0 - (200 - 70t/60)
```

- Write the following function using parameters for A, B, C, and D:

$$f(t; A, B, C, D) = A\sin(Bt - C) + D$$

Let the default values be $A = 1$, $B = 1$, $C = D = 0$.

Compute $f(1)$ (using the defaults $A == 1$, $C = D = 0$), $f(1; B = 2\pi)$, $f(1; A = 2\pi, B = 2\pi)$

- The following function is useful in probability

$$f(x) = \begin{cases} \frac{1}{b-a} & a \leq x \leq b \\ 0 & otherwise \end{cases}$$

Defaults are $a = 0, b = 1$.

Write a function using the ternary operator to compute this. Find $f(.5, a = 0, b = 1)$; $f(.5, a = 1, b = 2)$, $f(.5, a = 0, b = 100)$.

- Describe what the following function does to the argument f, when f is a function. (There isn't anything to do by recognize that `n` takes a function as input and returns a function as output, this question is how is `n(f)` related to `f`.)

```
n(f::Function) = x -> -f(x)
```