Tutorial 1 Questions
CS135 – Winter 2022

Below are several exercises that we will be covering in the upcoming tutorial (Friday, Jan. 14). We will release these exercises in advance of the tutorial so that you get a chance to attempt the exercises yourself before we discuss them in tutorial. The course staff running the tutorial will go through each problem (time permitting) and show their process for how they would complete these questions in an assignment/exam setting. Being familiar with the questions before attending tutorial will help to ensure that you get the most out of our explanations.

Note that tutorials are not mandatory in CS135. We never cover any new material that you won’t have seen in lectures, and instead choose to highlight techniques and concepts from the most recent lectures to give you some extra practice. If you are very comfortable with the material that we covered and could easily complete the below questions, then you aren’t obligated to attend tutorials. Be very cautious with this though since sometimes questions can seem easy until you actually sit down and attempt them.

Question 1: Math Translation
A near-universally revered math formula is the quadratic formula for finding the roots (i.e., x-intercepts) of a quadratic function. While we don’t (yet) have the ability in Racket to write functions that produce multiple values, we can write a similar function, `quadratic/negative`, that will produce one of the roots of a consumed quadratic function.

\[ \text{quadratic/negative}(a, b, c) = \frac{-b - \sqrt{b^2 - 4ac}}{2a} \]

Translate the above definition of `quadratic/negative` into Racket, using the names given. Remember to translate the function directly according to the process discussed in lectures and assignments. No design recipe is required for this translation.

Question 2: Minutes Since Midnight
You went to bed at midnight last night and woke up wanting to know how long you slept. You groggily look up at your clock and regret purchasing a numberless clock. You note the angle that your clock’s hour hand makes when measured clockwise from its starting vertical position.

Write a function (and associated design recipe), `hours-slept`, that consumes the current angle of your clock’s hour hand (with the angle given in degrees). `hours-slept` will produce the number of hours that you slept (i.e., the number of hours since midnight). It’s still dark outside, so you assume you can’t possibly have slept for more than 12 hours (so the angle will be strictly less than 360°).

For example, the hour hand has moved 240° from its starting vertical position. We can then calculate that we have slept for 8 hours.
Question 3: Number Picker
Write a function (and associated design recipe), pick-number, which will consume two numbers, num1 and num2, as well as a third number, choice. If choice is 1, then pick-number will produce num1. If choice is 2, then pick-number will produce num2. You can assume choice will only ever be given the values 1 and 2. As with Assignment 1, you may only use language features up until the end of Module 3 (no cond allowed). Some examples,

(pick-number 20 22 1) => 20
(pick-number 20 22 2) => 22