CS 1101 A-Term 2021 Professor Engling

Homework 1 - Defining Structs (120 Points)

Due: Tuesday, September 7 at 11pm EDT

If you have one, you should work with your homework partner on this and all remaining homework assignments.

The Expectations on Homework document remains posted under Assignments in Canvas.

Assignment Goals

- To gain experience modeling data using Racket structs.
- To assure you can write programs using `cond`, structures, and nested structures
- To gain additional practice in combining functions

Reminders

- Your solutions to the following problems should use helper functions in place of repeated code and to improve the readability of your code.

- Remember to include a signature, purpose, and test cases for every function you write, including helpers.

- Make sure you read each problem carefully and create a signature that conforms to the problem description. *You must name each function with the exact name specified in the problem. Your signature must conform to the problem description. Otherwise, we won't be able to run our automated tester on your program, and you'll lose points*. Programs that don't work with our auto-tester (and thus must be tested manually) will be penalized with a deduction of 10% of the total number of points for the assignment.

- Each test case you develop should be annotated with a brief comment that describes the situation being tested.

The Assignment

The website for a movie theater contains information about each of the films currently being shown in the theater. The following information is stored for a film:

- the title of the film
- the film's genre (drama, comedy, family, etc.)
- the film's rating. A rating can be one of G, PG, PG-13, R, NC-17, NR.
- the running time of the film, in minutes
- the date the film opened at the theater (it should include the year, month, and day)
- the total box office receipts collected so far for the film (in millions of dollars)

Problems

1. **(20 Points)** Provide data definitions for both a **Film** and a **Date**. Include both the define-structs and at least three examples for each data definition. When creating a struct, the order of the fields in the constructor should match the order given in the descriptions above. The names of the fields in the struct don't matter, but the order does. For example, the fields of the struct for a film should be the **title**, **genre**, **rating**, **running time**, **opening date**, and **receipts collected**, in that order. *Failure to define the fields in the given order will cause our auto-tester to fail, and you will lose points*. Your struct for a **Date** should have 3 fields, one for the **year**, one for the **month**, and one for the **day**, in that order. Each field in a **Date** is of type Natural.

2. **(15 Points)** In a comment in the Definitions Window, state the *signatures* of all the procedures that are created by Racket for your **Film** struct.

3. **(20 Points)** Write a function `suitable-for-children?` which consumes a **Film** and returns true its **rating** is G, PG, or PG-13, and returns false otherwise.

4. **(20 Points)** Write a function `difference-in-receipts` which consumes two **Film**s and produces a Number. The number produced is the difference between the box office receipts for the two films (the result should be a non-negative number).

5. **(20 Points)** Write a function `modify-rating` which consumes a **Film** and a String (representing a **rating**), and produces a **Film**. The **Film** that is produced is the same as the original except that its **rating** has been replaced by the given **rating**.

6. **(25 Points)** Write a function `opens-before?` which consumes a **Film** and a **Date**, and produces a Boolean. The function produces true if the given **Film** opens before the given **Date**, and returns false otherwise.

Grading

Programs must run to receive credit.
Note that code that is commented out will not be graded.
The grading rubric the graders will use is posted in Canvas below this assignment.

What to Turn In

Using Canvas, turn in a single .rkt file containing all code and documentation for this assignment.

Name your file according to the name conventions for files in CS 1101 posted with Assignments in Canvas.

Both partners' names and WPI usernames must appear in a comment atop the file.