Assignment 4

Due on **February 10th, end of the day**. Please follow the submission instructions in the "notes for all labs" on Moodle. You are required to do all of this assignment, but the bolded parts are what you should submit.

- Read the "Notes for All Labs" document on Moodle. All assignments must be submitted as specified there.
- Re-read Chapter 3 of your text, and read chapter 4. This assignment mostly follows along with the material covered in those chapters . You may want to review Chapters 1 and 2 for help with syntax.
- All of your code should be in a file called your_id_330_lab4.hs, where your_id is your Earlham user ID.

Coding Assignment 4.1: (4 Points)

Write two functions that use pattern matching for their operation. In a comment, describe what they do. At least one of your functions should have at least three cases.

Written Assignment 4.2: (3 Points)

In a few sentences, describe what is meant by a **local definition**.

In a few sentences, describe what is meant by a **local function**. When might we want to use a local function?

Coding Assignment 4.3: (2 Points)

Section 4.2 of your text defines a `fourPics` function. Using local definitions and/or functions (with `where`), give two other ways of completing the definition of `fourPics`. You may use either Pictures or PicturesSVG for this. (If you use Pictures, the horses are facing the other direction by default. You can either make your Pictures horses look like they do in the text, or the other way around.)

Coding Assignment 4.4: (6 Points)

Define a new Enumerated Type, the way that `Move` is defined in section 4.3 of your text. (Don't use Rock/Paper/Scissors.) Your new Type should have at least three possible values. Write two functions that either take your Type as an argument or that produce your type as an output (or both). If there's anything non-obvious about what your Type represents, explain it in comments.

Your Type should be of at least one typeclass. (Show and Eq are pretty easy ones.) Look up what functions a Type is expected to support if it belongs to that typeclass, and check to see if yours supports those functions. (You'll almost certainly want to use the `deriving` functionality here.)

Coding Assignment 4.5: (4 Points)

Define a function called `rangeProduct` that takes two integer arguments, m and n. It should return the product of all of the values between m and n, inclusive. Your function should

return 0 if m is larger than n. Write this function using recursion. (This is similar to Exercise 4.17 in your text.)

Coding Assignment 4.6: (4 Points)

Define a function called `recurseMult` that takes two Integer arguments, m and n. (You can assume they are both positive.) The function should return m * n, but you should not use the built-in multiplication function anywhere in your function. Instead, you should use recursion and addition to do the multiplication. (This is similar to Exercise 4.19 in your text.) You can assume both numbers are positive, but if you're able to figure out a way to handle 0 and negative numbers, that's even cooler (but is not worth any extra points).

Written Assignment 4.7: (4 Points)

Devise test data for a function

```
allEqual :: Integer -> Integer -> Integer -> Bool
```

that is intended to test whether its three integer inputs are equal. Use the strategies described on pages 91-94 of your text. (Exercise 4.13 in your text.)

Written Assignment 4.8: (2 Points)

What distinguishes Pattern Matching from the use of Guards?

Written Assignment 4.9: (2 Points)

Choose a topic introduced in **Chapters 1-3** or an assignment problem from **Assignment 1-3** that you most wish to review before the upcoming exam. Describe your current understanding of the topic or problem in a few sentences (up to a paragraph), and what still confuses you about it. (This will help me build review material.)

Discussion Prep 4.10: (4 Points)

Give at least three thoughts or questions you had about the chapter 4 reading.

Preparation for the Future

Moving forward, the expectation will be that you feel comfortable with the topics covered in this assignment. If you do not, you should ask questions on Piazza and/or continue to practice with GHC. If you want more practice, try exercises 4.25 through 4.30 in your textbook, and others. (You do not have to submit these, but I would encourage you to do them.)