MA 151: Homework #8

due Tuesday November 17

Written problems
No written problems!

Programming problems
We will use a type called Haffie which is like Int but allows “and a half”. So 15 and a half is a valid Haffie. Define the type like this:

```
data Haffie = H Int Bool
```

The Integer is the whole number part, and the Bool represents whether or not there is an extra half. So the number 4.5 would be H 4 True, while the number 7 would be H 7 False. Let’s say that negative numbers work this way: $-5$ is H (-5) False, and $-5.5$ is H (-6) True. (We think of $-5$ as $-6 + \frac{1}{2}$.)

- Define a function called haffieAdd which adds two numbers of type haffie.
- Put Haffie in the Show class. Make them display like so:
  - H 4 False shows as: 4
  - H 4 True shows as: 4 and a half
  - H 0 True shows as: a half
  - H (-4) True shows as: negative 3 and a half
  - H (-1) True shows as: negative a half
- Put Haffie in the Eq class.
- Put Haffie in the Ord class. (You need to define (<=))
- Put Haffie in the Enum class.
  - If you do it right, you should be able to evaluate [(H 3 False) .. (H 5 True)] and get:
    - [3, 3 and a half, 4, 4 and a half, 5, 5 and a half]
- Put a comment in your code explaining why it wouldn’t make sense to put Haffie in the Num class.
- Write a function of type IO () called greeter which asks for the user’s name, then waits for user input. If the user’s name is less than 5 letters, it says “That’s a short name!” Otherwise it says “That’s a long name!”
- Write a function of type IO () called mpg which does an interaction like this: (stuff in italics is user input)
  - Miles driven? 20
  - Gallons used? 4
  - You drove 5.0 miles per gallon!