Homework 5

Due Thursday, 2/28/2019

No programming this week, so just turn in a pdf to `https://submit.cs.pomona.edu/2019sp/cs131`.

1. (20 points) **Lazy Evaluation and Parallelism**

   Please do problem 4.11 from Mitchell, page 87.

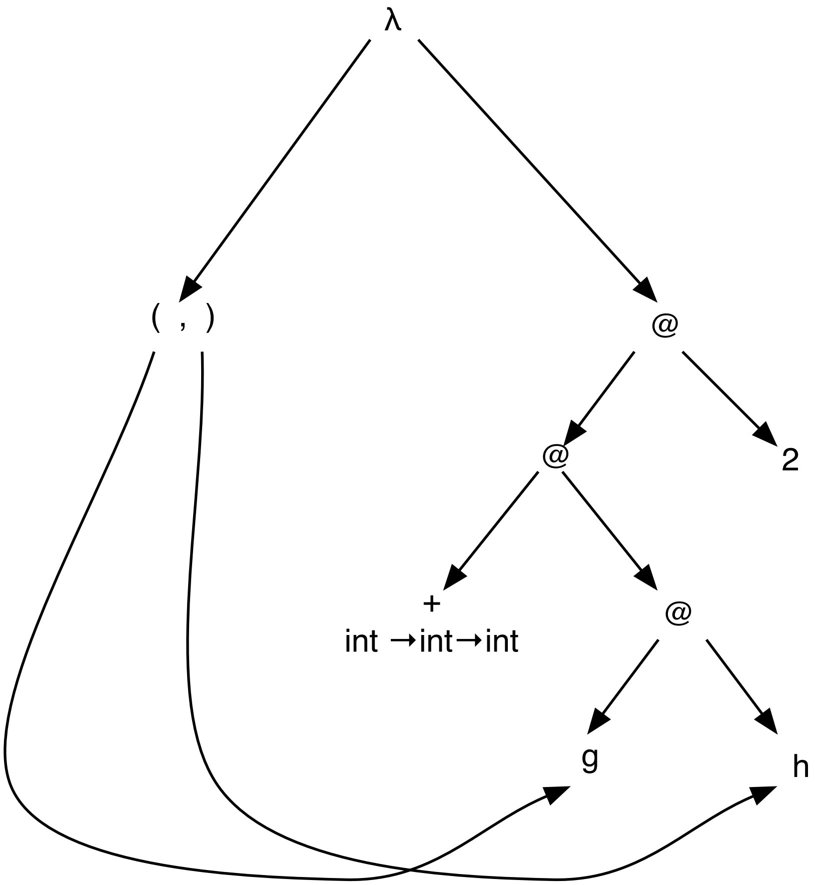
   The function g should be defined as follows (there may be a typo in the book, depending on the printing):

   ```
   g(x, y) = if x == 0
                   then 1
                   else if x + y == 0
                      then 2
                      else 3
   ```

2. (10 points) **Parse Graph**

   Use the parse graph below to calculate the Haskell type for the function. (This is problem 6.5 on page148 of the revised Chapter 6.)

   ```
   fun f(g,h) = g(h) + 2;
   ```



Be sure to show your work!

3. (10 points) **Type Inference and Bugs**

   What is the type of the following Haskell function:

```
append([],l) = l
append (x:l,m) = append(l,m)
```

   Write one or two sentences to explain succinctly and informally why append has the type you give. This function is intended to append one list onto another. However, it has a bug. How might knowing the type of this function help the programmer to find the bug?

4. (10 points) **Type Inference and Debugging**

   Please do problem 6.8 from Mitchell's revised Chapter 6, page 149.

   NOTE: There is an important typo in the problem. The (incorrect) definition of `reduce` should be:

```
reduce(f,[x]) = [x]
reduce(f,(x:y)) = f(x,reduce(f,y))
```

Notice the extra square brackets in the first clause!

In your answer to this problem, explain how to fix the definition.

5. (15 points) **Dynamic Typing in Haskell**

   Please do problem 6.11 from Mitchell's revised Chapter 6 page 151.

   For part c, assume that `car` returns `nil` when applied to anything other than a `Cons` cell.