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CSE 341 — Haskell Mini-Exercises # 1

These are questions for discussion in class. (You don’t need to hand in anything.) The solutions are on the class web page.

1. What is the type of each of the following expressions? (Some of them give type errors.)

   ```
   "squid" ++ "clam"
   [True, False, True, True]
   [True, False, ’a’]
   (True, False, ’a’)
   ```

2. Write a Haskell function to find the cube of a Double. What is the type of this function?

3. Write a Haskell function to find the sum of three Doubles. What is the type of this function?

4. Write a Haskell function to find the value of the quadratic expression $ax^2 + bx + c$ for parameters a, b, c, and x. What is the type of this function?

5. Write a Haskell function to reverse a list. What is the type of this function?

6. Write a function `my_map2` that is analogous to `map` but works for functions of two arguments rather than one. What is its type? For example,

   ```
   map2 (+) [1,2,3] [10,11,12]
   ```

   should evaluate to [11,13,15]

7. Give a recursive definition of a list `doubles` whose first element is 10, and whose n^{th} element is twice the $n-1^{st}$, i.e. `[10, 20, 40, 80, 160, 320, ....]`.

8. Give an alternate non-recursive definition of `doubles` using the built-in function `iterate` from the Haskell prelude. This is defined as follows:

   ```
   iterate          :: (a -> a) -> a -> [a]
   iterate f x      =  x : iterate f (f x)
   ```

9. Define a Haskell list `dollars` that is the infinite list of amounts of money you have every year, assuming you start with $100 and get paid 5% interest, compounded yearly. (Ignore inflation, deflation, taxes, bailouts, the possibility of total economic collapse, and other such details.) So `dollars` should be equal to `[100.0, 105.0, 110.25, ...]`.

10. Suppose that the following Haskell script has been filed in.

    ```
        my_const c x = c

        append [] ys = ys
        append (x:xs) ys = x : append xs ys

        my_map f [] = []
        my_map f (x:xs) = f x : my_map f xs
    ```

What is the type of each of the following Haskell expressions? (Some may give an error.)

(a) `my_const`

(b) `my_const True`

(c) `append`

(d) `append []`

(e) `append [True, False]`

(f) `append [3] [’a’, ’b’]`

(g) `append "squid" [’a’, ’b’]`

(h) `my_map`

(i) `my_map (my_const True)`

What is the value of each of the following Haskell expressions?

(a) `my_const 5 "octopus"`

(b) `my_map (my_const "squid") [1 ..]`

(c) `my_map sqrt [1, 2, 100]`