Programming in Haskell 2nd edition Hutton Solutions Manual

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Appendix A Selected solutions

In this appendix we present model solutions to selected exercises for each chapter. If solutions are being tested out using GHCi, note that some functions may need to be renamed to avoid clashing with built-in functions from the standard prelude. For example, `product` could be renamed to `myproduct`.

A.1 Introduction

Exercise 1

```
    double (double 2)
=       { applying the inner double }
    double (2 + 2)
=       { applying double }
    (2 + 2) + (2 + 2)
=       { applying the first + }
    4 + (2 + 2)
=       { applying the second + }
    4 + 4
=       { applying + }
    8
```

or

```
    double (double 2)
=       { applying the outer double }
    (double 2) + (double 2)
=       { applying the second double }
    (double 2) + (2 + 2)
=       { applying the second + }
    (double 2) + 4
=       { applying double }
    (2 + 2) + 4
=       { applying the first + }
    4 + 4
=       { applying + }
```

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```
8
```

There are a number of other possible answers.

Exercise 2

```
    sum [x]
=       { applying sum }
    x + sum []
=       { applying sum }
    x + 0
=       { applying + }
    x
```

Exercise 3

```
product []     = 1
product (n:ns) = n * product ns
```

For example:

```
    product [2,3,4]
=       { applying product }
    2 * (product [3,4])
=       { applying product }
    2 * (3 * product [4])
=       { applying product }
    2 * (3 * (4 * product []))
=       { applying product }
    2 * (3 * (4 * 1))
=       { applying * }
    24
```

Exercise 4

```
qsort []     = []
qsort (x:xs) = qsort larger ++ [x] ++ qsort smaller
               where
                  larger  = [b | b <- xs, b > x]
                  smaller = [a | a <- xs, a <= x]
```

Exercise 5

Duplicate elements are removed from the sorted list. For example:

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