**Group Activity 15: CS 3060**

**Haskell.**

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Points: 10.

**Task 1:** (5 points) Understanding the partial function concept.

*prod x y = x\*y*

*foo = prod 3*

*z1 = foo 4*

-- What is foo? What does it do?

Anonymous function: multiplies by three.

--Sample Answer: foo is an anonymous function which is \z -> 3\*z

-- What is the input and output type of function foo?

Input: integer, output: integer

--Sample Answer: Num a => a -> a

-- What is the input and output type of function prod?

Input: two integers, Output: integer.

--Another example is below.

*expo x y = x^y*

*bar = expo 3*

*z2 = bar 4*

-- Express *bar* as an anonymous function.

Its already anonymous

-- What is the input and output type of *bar*?

Input: Integer Output: Integer

-- What is the input and output type of function *expo*?

Input: two integers Output: Integer

**Task 2**: (5 points). Below is some Haskell code to model and process a collection of books.

import Data.List

data Genre = Fiction | NonFiction deriving (Show, Eq)

data Cover = Hard | Paperback | Ebook deriving (Show, Eq)

type Book = (Genre, Cover, Double)

          -- 3rd attribute represents book-price, which is a Double

type Collection = [Book] -- this represents a collection of books

price :: Book -> Double

price (g,cov,p) = p

totalVal :: Collection -> Double

totalVal c = sum (map price c)  -- think about how this code works

book1 = (Fiction, Hard, 10.2)

book2 = (NonFiction, Paperback, 10)

book3 = (Fiction, Ebook,8.5)

book4 = (NonFiction, Paperback, 20.0)

book5 = (Fiction, Ebook, 60.50)

        -- here create 2 additional books with random attributes

        -- so, now there are 5 books in total

collc = [book1,book2,book3,book4,book5]

        -- include the additional 2 books in the above list

--task a (1 point): run the code below and check value of output1.

output1 = totalVal collc

-- What does output1 represent?

-- Represent the total price of the collection combined

--task b (2 point): write a function foo which takes two books as input and foo returns the higher-price book.

-- what is the input and output type of foo?

-- input: two Books, output: Book

foo :: Book -> Book -> Book -- fill in the blank

foo x y = if (price x > price y) then x else y    -- fill in the blank

output2 = foo book1 book2

-- What does output2 represent?

-- Represents the higher priced book between the two given

-- (Fiction,Hard,10.2)

-- task c: write a function numFiction which takes a collection of books as input and returns the number of Fiction books present in the collection. A template is given below. Complete it.

-- what is the input and output type of numFiction?

-- input: Collection  Output: Integer

numFiction  [] = 0

numFiction ((Fiction,\_,\_):t ) = 1 + numFiction t

numFiction ((\_,\_,\_):t ) = numFiction t

output3 = numFiction collc

-- What does output3 represent?

-- Represents the total number of fiction books within the colection

-- task d: write a function listFiction which takes a collection of books as input and returns the list of

    --Fiction books present in the collection.

-- what is the input and output type of listFiction?

--input: Collection Output: List

listFiction  [] = []

listFiction ((g,c,p):t)

  | g == Fiction = (g,c,p) : listFiction t

  | otherwise = listFiction t

output4 = listFiction collc

-- What does output4 represent?

-- Represents a list filled with fiction only books

-- task e: write a function isFiction which takes a book as input ---and returns True if the book is a

    --Fiction and False otherwise. --

    --Then, use Haskell filter to do the equivalent job of listFiction.

isFiction  (g,c,p)

    | g == Fiction = True

    | otherwise = False

output5 = filter isFiction collc

-- What does output5 represent?

-- Represents a list filled with fiction books only

main :: IO ()

main= do

    print(output1)

    print(output2)

    print(output3)

    print(output4)

    print(output5)

Output:

> ./task

109.2

(Fiction,Hard,10.2)

3

[(Fiction,Hard,10.2),(Fiction,Ebook,8.5),(Fiction,Ebook,60.5)]

[(Fiction,Hard,10.2),(Fiction,Ebook,8.5),(Fiction,Ebook,60.5)]

**--Submission instruction**: Each group is required to submit one copy of the work (after answering ----questions and filling in the blanks of this word document) on Canvas.