

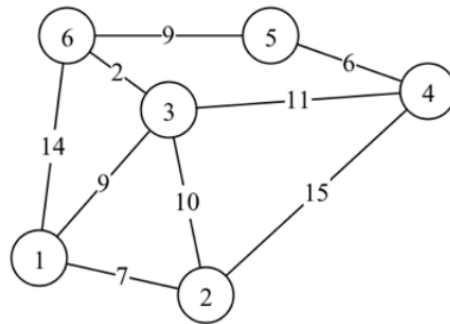
Homework 13 - Functional Programming

* If there is any problem, please contact TA.

Name:..... Student ID:..... Email:

Please include your code file and a screenshot of execution result for each program problem in your submit.

Problem 1. (40 points) For the weighted graph below where the weights denote distances, write programs to describe this graph and find the shortest distance from node 1 to node 5.



(a) Implement in Haskell¹

(b) Implement in Scheme²

Problem 2. (30 points) Please write a program of Symbolic Differentiation with simplification. We still use Cambridge Prefix notation.

```
> diff "x" (Add (Mul (Num 2) (Var "x"))) (Num 1))
```

```
Num 2
```

(a) Implement in Haskell

Problem 3. (30 points) Eight queens problem. The Eight queens puzzle is the problem of placing eight chess queens on an 8x8 chessboard so that no two queens threaten each other. Thus, a solution requires that no two queens share the same row, column, or diagonal. Represent the positions of the queens as a list of numbers 1..N. Example: [4,2,7,3,6,8,5,1] means that the queen in the first column is in row 4, the queen in the second column is in row 2, etc..

(a) Implement in Scheme

Remark: You just need to send your .pdf file to likaijian@sjtu.edu.cn. Email Subject line Format(also the pdf file name): **HW_X_Name.StudentID**

¹You can use an online environment: https://www.tutorialspoint.com/compile_haskell_online.php or download Haskell from <https://www.haskell.org/platform/>.

²You can use an online environment: https://www.tutorialspoint.com/execute_scheme_online.php