COMP 130 CAT II   31/03/2023

(1) A survey of 100 college students gave the following data:

　　　　8 owned a car (C)

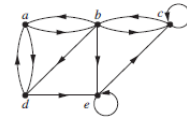　　　　20 owned a motorcycle (M)

　　　　48 owned a bicycle (B)

　　　　38 owned neither a car nor a motorcycle nor a bicycle

　　　　No student who owned a car, owned a motorcycle **6 marks]**

　　How many students owned a bicycle and either a car or a motorcycle?

(2) Represent the graph on the right with an adjacency matrix. **[3 marks]**

(3) Represent the expression $((x+2 \uparrow 3)*(y-(3+x)-5$ using a binary tree. Write these expressions in:

　(i)　Binary tree　　　　　　　　　　　　　　　　**[3 marks]**

　(ii)　Prefix;　　　　　　　　　　　　　　　　　**[2 marks]**

　(iii)　Postfix and　　　　　　　　　　　　　　**[2 marks]**

(4) What is the value of the following expressions?

　a. prefix expression: $+ - \uparrow 3\ 2 \uparrow 2\ 3\ /\ 6 - 4\ 2$　　**[2 marks]**

　b. postfix expression: $3\ 2 * 2 \uparrow 5\ 3 - 8\ 4\ / * -$　　**[2 marks]**

(5) Suppose the preorder and inorder traversals of a binary tree T yield the following sequences of nodes:

　　Preorder: G, B, Q, A, C, K, F, P, D, E, R, H

　　Inorder: Q, B, K, C, F, A, G, P, E, D, H, R

　(i)　Draw the diagram of T.　　　　　　　　　　**[6 marks]**

　(ii)　Find: (i) depth d of T; (ii) descendants of B.　**[2 marks]**

　(iii)　List the terminal nodes of T.　　　　　　　**[2 marks]**

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