[CSIE] Data Structures: Homework 2022

Scope: CH 3

Note that this homework does not need to be handed in, and no score is calculated. Some of these questions may appear in the mid-term exam.

1. Write the prefix and postfix forms of the following expression.
   $B - E/(F/A - A * D/F) + E * C * D - (A + B) * E$

2. Implement two functions of stack, push and pop.

```
element stack [MAX_SIZE]
int top = -1;
void push(element item) {
    // if stack is full, print "STACK IS FULL"
    // else push the item
}
element pop() {
    // if stack is empty, print "STACK IS EMPTY"
    // else delete and return the top element from the stack
}
```

3. Please provide your answer to the reason why a circular queue is needed instead of a linear queue using arrays.

4. Please finish the C function below:

```
void add_circularq(element item) {
    /* add an item to the circular queue */
}
```

5. What is the maximum path length from start to finish for any maze of dimensions $rows \times columns$?

6. Convert infix: $(1 + 2) * (3 + 4)$ to prefix and postfix.

7. We must represent two stacks in an array, $memory[MEMORY\_SIZE]$. Write two C functions that add and delete an item from stack 0 and stack 1. Your functions should be able to add elements to the stacks as long as the total number of elements in both stacks is less than $MEMORY\_SIZE$.

8. Describe the stackFull strategy in multiple stack. By the stackFull strategy, the add function should be able to add elements to the stacks as long as the total number of elements in all stacks is less than $MEMORY\_SIZE$.