

Computing for Engineers – ENGG 233

Lab 7

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L01

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Exercise 1: Tracing and Memory Diagram

1. $a[3] = 49$ $b[1] = 66$ $d[\text{len}(d)-1] = 0$
2. $d[i] = 6$ $d[j] = 0$
3. $d[i] = 8$ $d[j] = 18$
4. $d[0] = 6$ $d[1] = 55$ $d[2] = 0$ $d[3] = 18$ $d[4] = 77$ $d[5] = 0$ $d[6] = 8$
 $d[7] = 49$ $d[8] = 66$ $d[9] = 88$ $d[10] = 0$
5. An error would occur, as the index $d[11]$ does not exist. It does not exist because the array is 11 elements long, meaning it has indices of 0-10.

Exercise 2: Array Length

```
a = [101, 102, 103, 104]
b = [2, 3, 4]
allItems = []
i = 0

for i in range(0, len(a)):
    allItems.append(a[i])

for j in range(0, len(b)):
    allItems.append(b[j])
    i += 1

for i in range(0, (len(a) + len(b))):
    print(allItems[i])
```

```
101
102
103
104
2
3
4
```

Exercise 3: Array Predefined Functions

```
myList = [11, 12, 13, 14, 15, 16, 17, 18, 19]
myList.remove(13)
myList.remove(14)
myList.remove(15)
print (myList)
```

```
[11, 12, 16, 17, 18, 19]
```

Exercise 4: Two-Dimensional Arrays

```
n = int(input("Enter a number: "))
matrix = [[0 for i in range(n)] for j in range (n)]

counter = 1
row = 0
column = 0

for i in matrix:
    for j in i:
        if counter == 0:
            matrix[row][column] = 1
            counter += 1
            column += 1
        else:
            counter -= 1
            column += 1
    row += 1
    column = 0
    if counter == 0 and n % 2 == 0:
        counter = 1
    elif not(counter == 0) and n % 2 == 0:
        counter = 0
    elif counter == 0 and not(n % 2 == 0):
        counter = 0
    else:
        counter = 1

for i in matrix:
    for j in i:
        print(j, end = " ")
    print()
    print()
```

```
Enter a number: 5
0 1 0 1 0

1 0 1 0 1

0 1 0 1 0

1 0 1 0 1

0 1 0 1 0
```

Exercise 5: Merging Sorted Lists Program

```
import random

def merge_sort(array_1, array_2, n_in, m_in):
    array_3 = []
    counter = 0
    i = 0
    j = 0
    while counter <= n_in + m_in:
        if array_1[i] <= array_2[j]:
            array_3.append(array_1[i])
            i += 1
            counter += 1
        else:
            array_3.append(array_2[j])
            j += 1
            counter += 1
        if i == n_in:
            while j < m_in:
                array_3.append(array_2[j])
                j += 1
            return array_3
        if j == m_in:
            while i < n_in:
                array_3.append(array_1[i])
                i += 1
            return array_3

def main():
    n = int(input("Please enter a number for the length of the first array: "))
    m = int(input("Please enter a number for the length of the second array: "))
    array_1 = []
    array_2 = []
    counter = 0
    while counter < n:
        array_1.append(random.randint(0, 50))
        counter += 1
    counter = 0
    while counter < m:
        array_2.append(random.randint(0, 50))
        counter += 1
    arrayS_1 = sorted(array_1)
    arrayS_2 = sorted(array_2)
    array_3 = merge_sort(arrayS_1, arrayS_2, n, m)
    print("The combination of the first and second array is: ", array_3)

if __name__ == "__main__":
    main()
```

```
Please enter a number for the length of the first array: 5
Please enter a number for the length of the second array: 5
The combination of the first and second array is: [6, 9, 28, 30, 32, 37, 41, 42, 43, 48]
```

Exercise 6: Array of All Unique Elements

```
def is_array_unique(array_in):
    counter_i = -1
    for i in array_in:
        counter_i += 1
        counter_j = 0
        for j in array_in:
            if i == j:
                if counter_i == counter_j:
                    continue
                else:
                    return False
            counter_j += 1
    return True

def main():
    array = [3, 5, 4, 20, 10]
    print(array)
    if is_array_unique(array) == True:
        print("The array is unique!")
    else:
        print("The array is not unique!")

if __name__ == "__main__":
    main()
```

```
[3, 5, 4, 20, 10]
The array is unique!
```

```
[3, 5, 5, 20, 10]
The array is not unique!
```