ET-580 – Review – Practice Problems

1. Recursively print all values from n down to 1 inclusive.

Complete the provided code as follows:

a. Write the steps to recursively print from n down to 1.
b. Implement a function based off of the algorithm steps.
c. Trace the recursive process.

Example Output (when n == 10)

10 9 8 7 6 5 4 3 2 1

2. Recursively sum all digits of the number n.

Complete the provided code as follows:

a. Write the steps to recursively sum the digits of a number n.
b. Implement a function based upon the steps.
c. Trace the recursive process.

Example Output (when n == 345)

12

3. Iteratively and recursively print an array.

Complete the provided code as follows:

a. Write the steps to iteratively print the digits of an array.
b. Implement a function based off of the steps in a.

c. Write the steps to recursively print the digits of an array in reverse.
d. Implement a function based off of the steps in c.
e. Trace the recursive process.

Example Output (for the array {1,2,3,4,5}

```
1 2 3 4 5
5 4 3 2 1
```

4. Randomly initialize an array with unique values.

Complete the provided code as follows:

a. Write the steps to randomly initialize an array with unique values that range from 1 to size inclusive.
b. Implement a function based off of the steps.

Example Output (where size is 10}

6 5 2 1 7 10 8 3 9 4

5. Append a value to a partially filled array.

Complete the provided code as follows:

a. Complete the print function for the partially filled array.
b. Write the steps to append a value to a partially filled array.
c. Implement a function based off of the steps.

Example Output

```
10 20 30 40 50 60 70 80
10 20 30 40 50 60 70 80 90
10 20 30 40 50 60 70 80 90 95
10 20 30 40 50 60 70 80 90 95 (append does not occur)
```

6. Insert a value into a partially filled array at a specified location.

Complete the provided code as follows:

a. Complete the print function for the partially filled array.
b. Write the steps to insert a value at a specific position in the array.
c. Implement a function based off of the steps.

Example Output

10 20 30 40 50 60 70 80 90 100
5 10 20 30 40 50 60 70 80 90 100
5 10 20 30 40 50 60 70 80 90 100 **150**
5 10 20 30 40 50 **55** 60 70 80 90 100 150

7. Insert a value into a partially filled array in sorted order.

Complete the provided code as follows:

a. Complete the print function for the partially filled array.
b. Write the steps to insert a value in sorted order into the array.
c. Implement a function based off of the steps.

Example Output

10 20 30 40 50 60 70 80 90 100
5 10 20 30 40 50 60 70 80 90 100
5 10 20 30 40 50 60 70 80 90 100 **150**
5 10 20 30 40 50 **55** 60 70 80 90 100 150

8. N-Queens: Print a 2D nxn image of a chessboard from a 1D array of size n.

Complete the provided code as follows:

a. Write the steps to display a 1D array as a 2D image where:
    1. Array indexes are row values of a Queen
    2. Array values are column values of a Queen
    3. Combined these values indicate the coordinates of each Queen
    4. Queen locations are printed as a 'Q'
    5. Non-Queen locations are printed as a '.'
b. Implement a function based off of the steps.

Example Output

Enter 4 column values (from 0 to 3): ***3 0 1 2***

```
. . . Q
Q . . .
. Q . .
. . Q .
```