WIA1002 Data Structure
Lab 1: Object Oriented Programming

1. Create a class Time that represents time of the day. The class consists of attributes for the hour and minute. The hour value ranges from 0 to 23 and the minute value ranges from 0 to 59. The class consists of constructor that initializes the time and hour. The class also consists of a method to check whether the time is valid and a method to display the time in hh:mm AM or hh:mm PM. Create a Tester class to test the program, given output below.

```
Hour: 13 Minute: 45  1:45 PM
Hour: 33 Minute: 15  Invalid time input
Hour: 10 Minute: 52  10:52 AM
```

2. Create a class that represents a Polynomial. The class is able to compute any polynomial function. Create a Tester class to test the program, given output below. Example Polynomial a =new Polynomial(degree, coefficientInArray).

```
The polynomial is 4.0x^3 +2.0x^2 -0.5x -20.0
when x = 2.0
4.0x^3 +2.0x^2 -0.5x -20.0 = 19.0
when x = -3.5
4.0x^3 +2.0x^2 -0.5x -20.0 = -165.25
```

3. Create a class SimpleNetwork to simulate ping command. The class consists of the name, IP address, subnet mask and status (on/off) of a host. The host can only ping each other if the hosts are from the same network. The host is from same network if the (host IP address AND host Subnet Mask) is equal to (destination IP address AND host Subnet Mask). Create a Tester class to test the program, given output below.

```
Host Name: Host 1 IP: 10.1.1.1 Subnet Mask: 255.255.255.224 Status: UP
Host Name: Host 2 IP: 10.1.1.2 Subnet Mask: 255.255.255.224 Status: DOWN
Host Name: Host 3 IP: 10.1.1.70 Subnet Mask: 255.255.255.224 Status: UP
Host Name: Host 4 IP: 10.1.1.15 Subnet Mask: 255.255.255.224 Status: UP
Host 1 cannot ping Host 2 because the destination Host 2 is down.
Host 1 cannot ping Host 3 because the destination Host 3 is located in different network.
Host 1 can ping Host 4
```

4. Create a banner system that used to print banner using traditional system.out.println. The system consists of a base abstract and a few derived classes. The derived classes are used to print a range of characters example (A-G, H-N, O-T, U-Z). Create a Tester class to test the program; given output below, when the sentence is fsktm. [You can share the classes with other classmates].

```
****   **  *  *  *****  *   *
*     *    * *     *    ** **
***    *   **      *    * * *
*       *  * *     *    *   *
*     **   *  *    *    *   *
```

5. Create FileIO Interface. The interface consists of two methods that write to the file and read from the file. Create two classes that implement the interface. The TextFile class read and writes sentences to the text file while the BinaryFile class read and writes sentences to the binary file. Create a Tester class to test the program, given output below.

```
Write to text file
Welcome to FSKTM!
Please register your matric number.
Please register your UMMail account.
Read from text file
Welcome to FSKTM!
Please register your matric number.
Please register your UMMail account.
Write to binary file
Welcome to FSKTM!
Please register your matric number.
Please register your UMMail account.
Read from binary file
Welcome to FSKTM!
Please register your matric number.
Please register your UMMail account.
```