Question 1

Create a complete program based on the following criteria:

A) Create class ***Staff***:
   (i) Protected data members: *name* (string), *id* (string), *age* (int), *salary* (float), *nett_salary* (float).
   (ii) Public member functions
   - **void setdata()**
     To get user input for all except *nett_salary*.

B) Create class ***Executive*** which inherits ***publicly*** from class ***Staff***.
   (i) Private data members: *OT_hrs* (int), *rate* (int).
   (ii) Public member functions
   - **void setExecutive()**
     To get user input for *OT_hrs* and *rate*.
   - **void cal_salary_exec()**
     To calculate *nett_salary* using **Formula: *nett_salary = salary + (OT_Hrs * rate)***.
   - **void display()**
     Display *name*, *id*, *age*, *salary*, *OT_Hrs*, *rate* and *nett_salary*.

C) Create class ***Salesperson*** which inherits ***publicly*** from class ***Staff***.
   (i) Private data members: *units* (int), *bonus* (float).
   (ii) Public member functions
   - **void setSalesperson()**
     To get user input for *units*.
   - **void cal_salary_sales()**
     To calculate *nett_salary*. **Formula**: ***nett_salary = salary + bonus***

     Refer to given table below for the bonus entitlement for a salesperson:

Units	Bonus (RM)
Greater than 500	500.00
Less than or equals to 500	250.00

   - **void display()**
     Display *name*, *id*, *age*, *salary*, *units*, *bonus* and *nett_salary*.

D) In ***main()***:
   Ask the user to select between Executive and Salesperson.
   - If the user selects Executive, create an object for class *Executive* and call the appropriate member functions.
   - If the user selects Salesperson, create an object for class *Salesperson* and call the appropriate member functions.
   - If the user does not select either, print "Invalid." message.
     [Note: refer to sample output screens]

Sample Output Screen #1

Enter [1] for Executive OR [2] for Salesperson: ***1***

Enter Name : ***James Wong***
Enter ID : ***203112***
Enter Age : ***23***
Enter salary : RM ***3000***
Enter OT hours : ***50***
Enter Rate : RM ***6.80***

Name : James Wong
ID : 203112
Age : 23
Salary : RM 3000.00
OT Hours : 50
OT Rate : RM 6.80
Nett Salary : RM 3340.00

Sample Output Screen #2

Enter [1] for Executive OR [2] for Salesperson: ***2***

Enter Name : ***Megan Bright***
Enter ID : ***1021224***
Enter Age : ***30***
Enter salary : RM ***4000***
Enter Units : ***300***

Name : Megan Bright
ID : 1021224
Age : 30
Salary : RM 4000.00
Units : 300
Bonus : RM 250.00
Nett Salary : RM 4250.00

Question 2

Modify ***main()*** of **Question 1** in order for repetitions to be allowed as long as user desires. The program should also output the total number of staffs and total payouts to the company staffs. You may include additional accessor function (to return *nett_salary*) in the *Staff* class. **[Note: refer to sample output screen below]**

Sample Output Screen

```
Enter [1] for Executive   OR   [2] for Salesperson : 1

Enter Name      : Peter Roy
Enter ID        : 2302321
Enter Age       : 30
Enter salary    : RM 3000
Enter OT hours : 50
Enter Rate      : RM 6.60

Name        : Peter Roy
ID          : 2302321
Age         : 30
Salary      : RM 3000.00
OT Hours    : 50
OT Rate     : RM 6.60
Nett Salary : RM 3330.00

Do you want to continue? Y
Enter [1] for Executive   OR   [2] for Salesperson : 2

Enter Name      : Mandy Gan
Enter ID        : 20322
Enter Age       : 20
Enter salary    : RM 3050
Enter Units     : 505

Name        : Mandy Gan
ID          : 20322
Age         : 20
Salary      : RM 3050.00
Units       : 505
Bonus       : RM 500.00
Nett Salary : RM 3550.00

Do you want to continue? Y
Enter [1] for Executive   OR   [2] for Salesperson : 1

Enter Name      : Salmiah Khan
Enter ID        : 2032186
Enter Age       : 36
```

```
Enter salary      : RM 2500
Enter OT hours : 30
Enter Rate        : RM 6.80

Name         : Salmiah Khan
ID           : 2032186
Age          : 36
Salary       : RM 2500.00
OT Hours     : 30
OT Rate      : RM 6.80
Nett Salary : RM 2704.00

Do you want to continue ? N

Total Staff: 3
Total Payouts is RM 9584.00
```

Question 3

Riley Piano Music Center is organizing a piano recital program. Students will need to perform their 3 selected piano pieces which will be rated by invited examiners. Therefore, the center needs a program that can determine the results of the participating students and provide a reward based on their achievement. Write a C++ program based in the following guidelines:

A) Create class ***Participant***
   (i) Protected data members: *name* (string), *location* (string), *age* (int).
   (ii) Public member functions:
   - Constructor to display ***"Participant Details"***.

B) Create class **Progress**
   (i) Protected data members: *date[3]* (string), *rate[3]* (float), *grade* (char).
   (ii) Public member functions:
   - **void mark_entry()**
     Using a *for* loop, get user input for *date* array and *rate* array. *Rate* should have a range of 1 to 5. Determine the average and call *set_grade(….)* by passing the average as parameter.
   - **void set_grade(..)**
     Determine *grade* based on average parameter:

average	grade
4.00 and above	A
3.00 and above but less than 4	B
All above is false	C

C) Create class **Result** which inherits **publicly** from **class Participant** and **class Progress.**
   (i) Private data members: *prize* (string).
   (ii) Public member functions:
   - **void setdetailst()**
     Get user input for *name*, *location*, *age*.

- **void display()**
  Display *name*, *location*, *age*, all the *rate* and *grade*.
  If the grade is A, assign *prize* with "Mug + RM 10 book voucher" else assign *prize* with "BPA free Water Bottle". Display the messages and the prize. **[Note: refer to sample output]**
- Friend function ***void summary(Result [], int)***. Refer to D) for more details.

D) **void summary(….)**
   (i) Two Parameters: an array of *Result* objects and integer that stores the *size* of the array.
   (ii) Display the summary of students' data that was entered. Example (for 4 students):
   Grade A: * *
   Grade B: *
   Grade C: *
   [Hint: Access the grade data member of each array element and declare some counter variables to keep track of the total A's, B's and C's.]

E) In *main()*:
   (i) Get user input for how many students' data to be entered.
   (ii) Declare a pointer called *Stud1* that points to a dynamic array of objects of ***Result*** class.
   (iii) For each object element, call the required member functions. **[Note: refer to sample output]**
   (iv) Display a summary by passing the array of objects and number of students to friend function ***summary(…)***
   (v) Deallocate memory of the dynamic array.

Sample Output Screen

```
Enter number of participants : 4
---------------------------------
        PARTICIPANT DETAILS
---------------------------------
---------------------------------
        PARTICIPANT DETAILS
---------------------------------
---------------------------------
        PARTICIPANT DETAILS
---------------------------------
---------------------------------
        PARTICIPANT DETAILS
---------------------------------
Enter Name    : John Ng
Enter Location : Melaka
Enter Age      : 20
---------------------------------
      RECITAL PROGRESS DETAILS
---------------------------------
Enter date (dd/mm/yy)    : 11/11/2021
Enter rating (between 1-5) : 4
Enter date (dd/mm/yy)    : 12/11/2021
Enter rating (between 1-5) : 5
```

```
Enter date (dd/mm/yy)     : 13/11/2021
Enter rating (between 1-5) : 4.2

-------------------------------------
           RESULT SLIP
-------------------------------------
Name     : John Ng
Location : Melaka
Age      : 20
Rating 1 : 4
Rating 2 : 5
Rating 3 : 4.2
Grade    : A
Congrats, you can claim your Mug + RM 10 book voucher!

Enter Name     : Hanisah Ali
Enter Location : KL
Enter Age      : 18
-------------------------------------
       RECITAL PROGRESS DETAILS
-------------------------------------
Enter date (dd/mm/yy)     : 13/11/2021
Enter rating (between 1-5) : 3
Enter date (dd/mm/yy)     : 13/11/2021
Enter rating (between 1-5) : 3.5
Enter date (dd/mm/yy)     : 14/11/2021
Enter rating (between 1-5) : 3

-------------------------------------
           RESULT SLIP
-------------------------------------
Name     : Hanisah Ali
Location : KL
Age      : 18
Rating 1 : 3
Rating 2 : 3.5
Rating 3 : 3
Grade    : B
Congrats, you can claim your BPA free Water Bottle!

Enter Name     : Cassie Teoh
Enter Location : Bangi
Enter Age      : 21
-------------------------------------
       RECITAL PROGRESS DETAILS
-------------------------------------
Enter date (dd/mm/yy)     : 11/11/2021
Enter rating (between 1-5) : 1.3
Enter date (dd/mm/yy)     : 12/11/2021
```

```
Enter rating (between 1-5) : 3.2
Enter date (dd/mm/yy)     : 14/11/2021
Enter rating (between 1-5) : 3

---------------------------------
          RESULT SLIP
---------------------------------
Name     : Cassie Teoh
Location : Bangi
Age      : 21
Rating 1 : 1.3
Rating 2 : 3.2
Rating 3 : 3
Grade    : C
Congrats, you can claim your BPA free Water Bottle!

Enter Name     : Walter Matthews
Enter Location : Melaka
Enter Age      : 20
---------------------------------
       RECITAL PROGRESS DETAILS
---------------------------------
Enter date (dd/mm/yy)     : 11/11/2021
Enter rating (between 1-5) : 4
Enter date (dd/mm/yy)     : 11/11/2021
Enter rating (between 1-5) : 4.5
Enter date (dd/mm/yy)     : 12/11/2021
Enter rating (between 1-5) : 4.5

---------------------------------
          RESULT SLIP
---------------------------------
Name     : Walter Matthews
Location : Melaka
Age      : 20
Rating 1 : 4
Rating 2 : 4.5
Rating 3 : 4.5
Grade    : A
Congrats, you can claim your Mug + RM 10 book voucher!

=================================
      Summary Results
=================================
Grade A: **
Grade B: *
Grade C: *
```