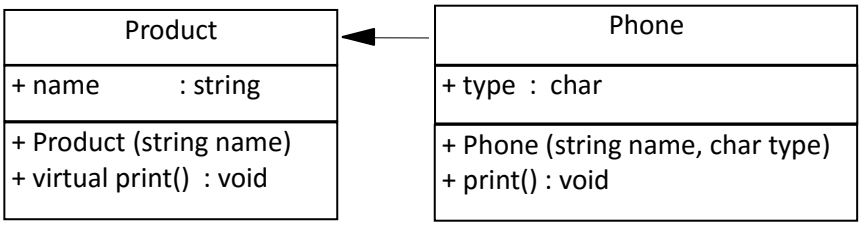
EHB354E - SAMPLE FINAL EXAM

Books, notes, electronic devices closed. Duration is 2 hours.

QUESTION 1) [40 points]

a) [25 points] Write C++ classes in the following UML class diagrams.
Product is base class, the Phone class is derived from the base class publicly.
(Access symbol : + is public).



b) [15 points] Write the main program to do followings.

- Declare an array of pointers (polymorphic) for Product class.
- Dynamically allocate following objects and store their pointers in the array.
- By looping, call print function of each object in the array.

Object	name	type
Phone	"P1"	'A'
Phone	"P2"	'B'
Product	"PR1"	-

QUESTION 2) [30 points] Write a C++ program to do the followings.

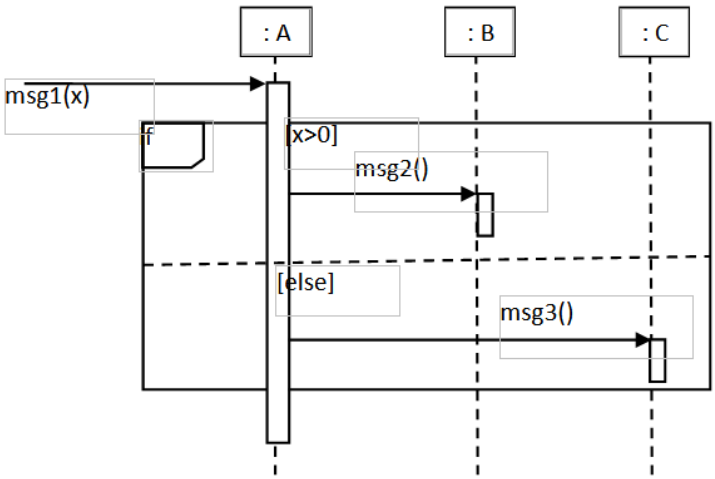
a) [15 points] Define a class named Polygon with public members below.

- VX and VY : Standard Template Library (STL) vectors of integers.
- Parameterized constructor: Polygon(vector<int> VX, vector<int> VY)
- print() function : By looping, function should display values stored in VX and VY vectors.

b) [15 points] In main program, do the followings.

- Define two integer arrays with values given below. Number of elements in both arrays are 5.
  xvalues : 3, 6, 3, -6, -6 yvalues : 7, 4, -2, 1, 7
- Define VX and VY as vectors of integers.
- Initialize vectors with the arrays as constructor parameters.
- Define a Polygon object named Pol, with VX and VY vectors as constructor parameters.
- Call print() function of Pol object, to display VX and VY vectors on screen.

QUESTION 3) [30 points] Write C++ classes and main program for the UML Sequence Diagram given below.



SAMPLE FINAL ANSWERS

ANSWER 1) [40 points]

a) [25 points]

```
#include <iostream>
using namespace std;

class Product { // Base class
public:
  string name;
  Product(string name)  :  name(name) {}

  virtual void print() {cout <<  name << " " ;}
 };
```

```
class Phone : public Product {
public:
  char type;
  Phone(string name, char type)
      : Product(name), type(type) {}

  void print(){cout << "Phone : ";
            Product::print();
            cout << type << endl;};
};
```

b) [15 points]

```
int main() {
  Product * array[3];

  array[0] = new Phone("P1",'A');
  array[1] = new Phone("P2",'B');
  array[2] = new Product("PR1");

  for (int i=0;i<3;i++)
     array[i]->print();
}
```

ANSWER 2) [30 points]

a) [15 points]

```
#include <iostream>
#include <vector>
using namespace std;

class Polygon {
public:
 vector<int>  VX;
 vector<int>  VY;
  Polygon(vector<int>  VX, vector<int>  VY) :
              VX(VX), VY(VY) {}
  void print()  {
    for (int i=0; i<VX.size(); i++)
         cout << VX[i] << "  " << VY[i]  << endl;
  }
};
```

b) [15 points]

```
int main() {
    int xvalues[5] = {3, 6, 3, -6, -6};
    int yvalues[5] = {7, 4, -2, 1, 7};
    vector<int>  VX (xvalues, xvalues+5); // Constructor
    vector<int>  VY (yvalues, yvalues+5); // Constructor
    Polygon Pol(VX, VY);
    Pol.print();
}
```

ANSWER 3) [30 points]

```
class C  {
public:
   void msg3() {}
};
```

```
class B  {
public:
  void msg2() {}
};
```

```
class A  {
public:
  void msg1(int x) {
     if (x>0) {
          B  b;
          b.msg2();
     }
     else {
          C c;
          c.msg3();
     }
   }
};
```

```
int main()  {
  A  a;
  a.msg1(20);
  return 0;
}
```