Questions and Answers

13. Review Questions & Exercises:

a. Fill in the Blanks

i. In C++ the _____ is the construct primarily used to create objects.
Ans - Class

ii. Members of a class object may be accessed through a pointer to the object by using the _____ operator.
Ans- Arrow Operator (->)

iii. A destructor has the same name as the class, but is preceded by a(n) _____ character.
Ans- Tilde (~) character

iv. _____ is a special built-in pointer that is automatically passed as a hidden argument to all non-static member functions.
Ans- this pointer

v. When a function is declared a _____ by a class, it becomes a member of that class.
Ans- friend

b. Answer the following:

i. What are the advantages of inline function?
Ans-
1) Inline Function speed up your program because it avoids the time waste due to function calling and response back.
2) Inline Function increases locality of reference by utilizing instruction cache.

ii. What is the difference between an instance member variable and a static member variable?
Ans- For static variable only one memory location is allocated irrespective to number of objects created and for Instance variable for each object one memory location is allocated.

iii. What limitation does a static member function have?
Ans- They can have access to only other static members (functions or variables) declared in the same class.

iv. When is a copy constructor called?
Ans- A copy constructor is called when an object is passed by value.

v. Assume that a class named Numbers has the following static member function declaration:
static void showTotal();
 Write a statement that calls the showTotal function.
Ans- Numbers::showTotal();

vi. State the difference between delete and delete [].
Ans- delete operator is used to deallocate memory of single variable whereas delete[] is used for memory deallocation of array.

c. Programming Assignments:

i. Circle Class

Write a Circle class that has the following member variables:

radius (double), constant pi(double) initialized with the value 3.14159

The class should have the following member functions:

1. Default Constructor: A default constructor that sets radius to 0.0
2. Constructor: Accepts the radius of the circle as an argument.
3. setRadius: A mutator function for the radius variable.
4. getRadius: An accessor function for the radius variable.
5. getArea: Returns the area of the circle, which is calculated as
   area = pi * radius * radius
6. getDiameter: Returns the diameter of the circle, which is calculated as
   diameter = radius * 2
7. getCircumference: Returns the circumference of the circle, which is calculated as
   circumference = 2 * pi * radius
Write a program that demonstrates the Circle class by asking the user for the
circle's radius, creating a Circle object, and then reporting the circle's area,
diameter, and circumference.

Ans-

```cpp
#include <iostream>

using namespace std;

class circle
{
    double radius;
    double const pi = 3.14159;

    public:

    circle()
    {
        radius = 0.0;
    }

    circle(double r)
    {
        radius = r;
    }

    void setRadius(double r)
    {
        radius = r;
    }

    double getRadius()
    {
        return radius;
    }

    double getArea()
    {
        return pi * radius * radius;
    }

    double getDiameter()
    {
        return 2 * radius;
    }

    double getCircumference()
    {
        return 2 * pi * radius;
    }
```

```cpp
};

int main()
{
    int choice = 0;

    cout<<"How do you want to set Circle's Radius"<<endl;
    cout<<"1)Set Default Value"<<endl;
    cout<<"2)Set Parametrized Value"<<endl;
    cout<<"3)Set Radius"<<endl;
    cout<<"Enter your choice : ";
    cin>>choice;
    if(choice == 1)
    {
        circle c;
        cout<<"Area : "<<c.getArea()<<endl;
        cout<<"Diameter : "<<c.getDiameter()<<endl;
        cout<<"Circumference : "<<c.getCircumference()<<endl;
    }
    else if(choice == 2)
    {
        float r;
        cout<<"Enter Radius : ";
        cin>>r;
        circle c(r);
        cout<<"Area : "<<c.getArea()<<endl;
        cout<<"Diameter : "<<c.getDiameter()<<endl;
        cout<<"Circumference : "<<c.getCircumference()<<endl;
    }
    else if(choice == 3)
    {
        circle c;
        float r;
        cout<<"Enter Radius : ";
        cin>>r;
        c.setRadius(r);
        cout<<"Area : "<<c.getArea()<<endl;
        cout<<"Diameter : "<<c.getDiameter()<<endl;
        cout<<"Circumference : "<<c.getCircumference()<<endl;
    }
    else
    {
        cout<<"Wrong Choice!!!";
    }

    return 0;
}
```

d. What is wrong with this code?
```cpp
T *p = new T[10];
delete p;
```
Ans- In the above code, it will deallocate memory of first object to which it is
pointing not of the entire array.
So to deallocate memory assigned to whole array delete[] operator should be used.
```cpp
delete[] p; //Deallocates memory of whole array
```