**BIT 142**

Intermediate Programming

*Mini Assignment 3*

Please show all of your work for each problem:   
Please type your answers in

* Times New Roman Font
* Size 12
* No bolding, italics, and/or underlining

1. **In your own words, define polymorphism (3 points):**it kind like a person at the same time can have different characteristic.
2. **In your own words, define each principle of polymorphism (3 points):**static overrunning

Dynamic overriding

1. **What is a base class and what is a derived class? (3 points)**
   1. **When would I use each?**  
      to extend base class functionality by adding or overriding members relvant to the derived class
2. **What is a search algorithm? (3 points)  
     
   is any algorithm which solves the search problem**
3. **Solve the following inheritance mystery: (2** at 5 points each**)**

(see next page)

class Bird

{

    public virtual void fly(){

        Console.WriteLine("Bird can fly");

    }

}

class Parrot : Bird

{

    public override void fly()

    {

        Console.WriteLine("Parrot can fly");

    }

}

class Program

{

    static void Main(string[] args)

    {

        Parrot p = new Parrot();

        p.fly();

    }

}

**Output:**

Bird can fly

Bird can fly

class X

{

    public virtual void foo()

    {

        Console.WriteLine("Parent");

    }

}

class Y : X

{

    public override void foo()

    {

        Console.WriteLine("Child");

    }

}

class Program

{

    static void Main(string[] args)

    {

        X c = new Y();

        c.foo();

    }

}

**Output:**

Child

1. **What is a super method? (3 points)  
     
   used inside a sub-class method definition to call a method defined in the super class.**
2. **What is run-time? (3 points)**
   1. **Why is run-time important?   
        
        
      if errors are found in the code the program can throw runtime errors.**
3. **Answer the following questions about runtime and sorting? (6 points)**

1. **Show each step to find the value 47 in the list below using Binary Search ? (3 points)  
     
   A close up of a sign

   Description automatically generated**

* **What is the run time and why?**
* 2
* 14 divide by 2 then run second time and the first one is 47

1. **What is the run-time of the following algorithm (6 points)**

a for (int i = 1; i <= 50; i++) {

......

}

O(1)

--------------------------------------------------

b. for (int i = 1; i <= n; i++) {

for (int j = 1; j <= n; j++) {

. . . . .

}

}

O(N^2)

--------------------------------------------------

c. for (int i = 1; i <= n; i++) {

. . . . . .

}

for (int j = n; j >= 1; j--) {

. . . . . .

}

O(1)

--------------------------------------------------

d. for (int i = 1; i <= n; i++) {

for (int j = 1; j <= n; j++) {

for (int k = 1; k <= n; k++) {

}

}

}

O(N\*3)

--------------------------------------------------

1. Polymorphism **(7 points)**
   1. Write a class named Animal
      1. Prints “I am an animal”
   2. Write a class named Giraffe
      1. Prints “I am animal”
      2. Has a height of 10 ft
      3. Weighs 80lbs
      4. Prints “I am big and tall!”
   3. Write a class named Cat
      1. Prints “I am a cat and I lovee to sleep…”
      2. Prints “zzz…” 24 times
   4. Write a class named Hippo
      1. Prints “I am animal”
      2. Has a height of 10 ft
      3. Weighs 80lbs
      4. Prints “I am big and tall!”
      5. Prints “My name is Happy the Hippo!” 100 times
   5. Create a main program that calls the 4 classes in any way you like to produce a unique output

using System;  
//define the class Animal  
public class Animal  
{

//print method prints the message  
 public void print()  
{  
 Console.WriteLine("I am an animal");  
}  
 }  
 //define the class Giraffe  
 public class Giraffe   
 { //print method prints the message  
public void print()  
{  
Console.WriteLine("I am animal");  
Console.WriteLine("Has a height of 10 ft");  
Console.WriteLine("Weighs 80lbs");  
Console.WriteLine("I am a big and tall!");  
}  
}  
//define the class Cat  
public class Cat  
{ //print method prints the message  
public void print()  
{  
Console.WriteLine("I am a cat and I lovee to sleep...");  
//print the message 24 times  
for(int i=1;i<=24;i++)  
Console.Write("zzz...");  
Console.WriteLine();  
}  
}  
//define the class Hippo  
public class Hippo  
{ //print method prints the message  
public void print()  
{  
 Console.WriteLine("I am animal");  
 Console.WriteLine("Has a height of 10 ft");  
Console.WriteLine("Weighs 80lbs");  
Console.WriteLine("I am a big and tall!");  
//print the message 100 times  
for(int i=1;i<=100;i++)  
Console.WriteLine("My name is Happy the Hippo!");  
}  
}