**Object Oriented Software Design**

**Tutorial 1 Introduction to Object Oriented Software Design**

1(a) What is design? Why is it important?

b) Counter the claim “*In an increasingly agile world developers need not spend much time in upfront design*” with your own arguments.

2a) Which of the following two statements are true?

Coupling is the number of dependencies between two subsystems

Cohesion is the number of dependencies within a subsystem.

b) Consider the design of an emergency response system below where three subsystems directly access the Database subsystem. Identify one main problem with this design and suggest an improved design.

ResourceManagement

IncidentManagement

MapManagement

ResourceManagement

Database

c) Assume that you are developing an application using Swing and AWT on an X11 platform. Describe using a UML component diagram how the architecture shields programmers from directly accessing low level X11 drawing facilities.

3. Please study the program below and identify which OO principle has been violated explaining why. Redesign the classes without violating that principle.

class Bird

{ public void eat() {…}

public void fly() {…}

public void sleep() {…}

}

class Parrot extends Bird { … }

class Penguin extends Bird { … }

class Crow extends Bird { … }

class BirdTest

{ Public static void main(String[] args)

{ List<Bird> birdList = new ArrayList<Bird>();

birdList.add(new Crow());

birdList.add(new Penguin());

birdList.add(new Parrot());

for ( Bird b : birdList )

b.fly();

}

}

3. Explain why the following design for a graphics editor violates the Open Closed principle.

Public void draw()

{

for ( Circle c : circles )

c.drawCircle();

for ( Square s : squares )

s.drawSquare();

for ( Triangle t : triangles )

t.drawTriangle();

}

addCircle()

addSquare()

addTraingle()

draw ()

ArrayList<Circle> circles;

ArrayList<Square> squares;

ArrayList<Triangle> triangles;

GraphicsEditor

Square

Circle

Triangle

4 a) What does the term pattern mean in the context of software development?

b) How do patterns help the software developer?

c) Briefy explain the benefits of the Model View Controller Pattern (with which you are familiar)