NORTH AMERICAN
U N I V E R S I T Y
INSPIRATION   INNOVATION   GLOBAL COMPETENCE

Name: _____ Grade: _____

Make sure that you have 6 questions:

Question	Est. Time	Weight	Grade	Notes
1	5 min.	10 points		
2	15 min.	20 points		
3	10 min.	10 points		
4	15 min.	10 points		
5	15 min.	10 points		
6	10 min.	6 points		
7	20 min.	14 points		

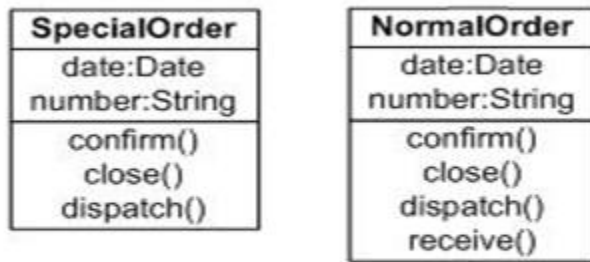Total Points: 80 points
Total Estimated Time: 90 minutes
Total Cut-off Time: 30 minutes

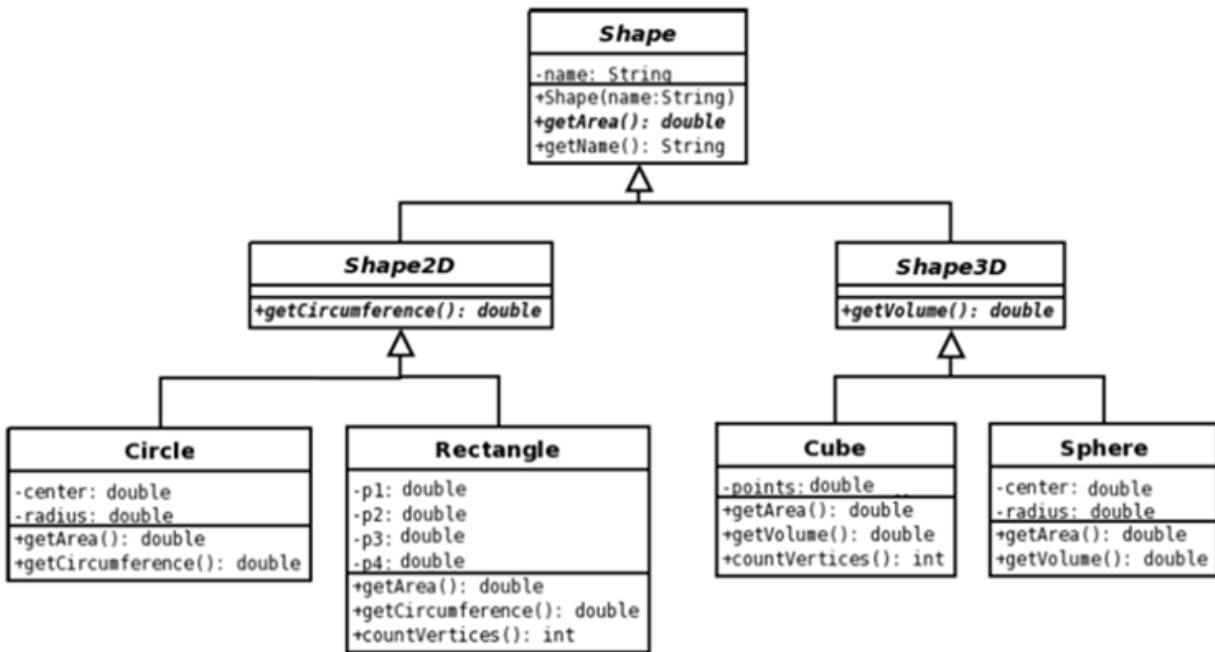This test is worth 20% of your final course grade.

This test is a closed book. You can one use one letter size paper as a Cheat Sheet . You are not allowed to use your PC, Mobile or any other communication devices.

Good Luck!!!!

1. Remodel the following class diagram using the Generalization Inheritance method. (10 pts.)

SpecialOrder
date:Date number:String
confirm() close() dispatch()

NormalOrder
date:Date number:String
confirm() close() dispatch() receive()

2. Write a Java code for the following class diagram. (20 pts.)

Shape
-name: String
+Shape(name:String) +*getArea(): double* +getName(): String

Shape2D
+*getCircumference(): double*

Shape3D
+*getVolume(): double*

Circle
-center: double -radius: double
+getArea(): double +getCircumference(): double

Rectangle
-p1: double -p2: double -p3: double -p4: double
+getArea(): double +getCircumference(): double +countVertices(): int

Cube
-points: double
+getArea(): double +getVolume(): double +countVertices(): int

Sphere
-center: double -radius: double
+getArea(): double +getVolume(): double

3. Design a Model Transformation for the following classes (10 pts.)

GoodYear
-center: Point
-radius: double
+getArea(): double
+getCircumference(): double

BridgeStone
-center: Point
-radius: double
+getArea(): double
+getCircumference(): double

Michelin
-center: Point
-radius: double
+getArea(): double
+getCircumference(): double

4. Refactor the following source code for the Transformation you did in part (c) (10 pts.)

```
public class GoodYear {
private point center
private double radius

public double getArea(){
   return area;
}
public double getCircumference(){
   return circumference;
}
}


public class Bridgestone {
private point center
private double radius

public double getArea(){
   return area;
}
public double getCircumference(){
   return circumference;
}
}


public class Michelin {
private point center
private double radius

public double getArea(){
   return area;
}
public double getCircumference(){
   return circumference;
}
}
```

5. Using the Bidirectional one-to-many association mapping, write a Java source code after transformation: (10 pts.)

Customer		Order
name:String	1 n	number:String
location:String		
sendOrder()		confirm()
receiveOrder()		close()

6. Identify 3 objects of each type of the ATM banking system. (6 pts.)

<<Entity>>	<<Control>>	<<Boundary>>
<<Entity>>	<<Control>>	<<Boundary>>
<<Entity>>	<<Control>>	<<Boundary>>

7. Draw the complete DCD for the following CRC cards. (14 points)

Front   Back

RequestController	
processTypeOfService processToInfo processSizeWeight	Customer

Customer	
verifyStatus findPickupRequest processNewPackage processPayment	CustomerAccount PickupRequest Package

name address phone

PickupController	
findPickupRequest processNewPakageInfo requestLabel processsPayment	Customer

CustomerAccount	
processPayment	Payment

balance dateBilled amountBilled

PickupRequest	
createNewRequest showRequests	Package

DTRequest DTPickedup location

Payment	
createPayment	

datePaid amountPaid type

Package	
createNewpackage printLabel	MovementEvent

deliverToName deliverToAddress weight cost DTdelivered

MovementEvent	
createEvent	Employee

typeOfEvent DtofEvent

Employee	
returnEmployeeInfo	

name address phone