

**Information and Computer Science Department**

**Summer Semester 163**

**ICS 201 – Introduction to Computing II**

**Midterm Exam**

**Open Part**

**Sunday, July 30, 2017**

**Duration: 90 minutes**

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| **Name:** |  |

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| **Question #** | **Max Score** | **Score** |
| **1** | 30 |  |
| **2** | 10 |  |
| **3** | 20 |  |
| **Total** | **60** |  |

**Question # 1**

Write a class **Container** that has:

1. instance variables:

double height: // the height of the liquid container in centimeters

double filledHeight; // the level of liquid in the container (if it equals height, container is full)

1. The class should have a constructor.
2. A method public void fill(double cm) that increases the filled height of a container by the given amount in centimeters. This method will throw **OverFillException** if we are overfilling the container.
3. A method public abstract double getBaseArea() that should return the base area of a given container.
4. A method public double getVolume() to get the volume of the container.

(Note: volume = height \* baseArea)

1. A method public double getFilledVolume() to get the volume of water that is filling the container.

(Note: filled volume = filledHeight \* baseArea)

1. An equals method that compares two **Container** objects based on their filledVolume.

Write two classes **CubicContainer** and **Cylinder** that are subclasses of Container.

The class **CubicContainer** has:

1. Instance variables representing width and length of the base.
2. Calculation of the base area (area = width \* length)
3. Appropriate constructor.

The class **Cylinder** has:

1. An instance variable radius, representing radius of the base.
2. Calculation of the base area (area = 3.14 \* radius2)
3. Appropriate constructor.

**Question # 2**

A palindrome is a string that reads the same forward and backward, such as "radar". Write a static recursive method that has one parameter of type String and returns true if the argument is a palindrome and false otherwise.

**Question # 3**

Write a program that converts a time from 24-hour notation to 12-hour notation. To make the solution easier, a requirement is imposed on the input: It must be in xx:xx format, i.e. it must have two digits, a semicolon, and then another two digits. Define an exception class called TimeFormatException. If the user enters an illegal time, like 10:65, or even gibberish, like 8&\*68, your program should throw and handle a TimeFormatException.

* 00:00 - Should print "0:00 AM".
* 12:00 - Should print "12:00 noon".
* 12:01 - Should print "12:01 PM".
* 11:59 - Should print "11:59 AM".
* 23:59 - Should print "11:59 PM".
* 24:00 - Should cause an exception.
* 11:60 - Should cause an exception.