



EASTERN UNIVERSITY, SRILANKA

DEPARTMENT OF MATHEMATICS

SECOND EXAMINATION IN SCIENCE - 2008/2009

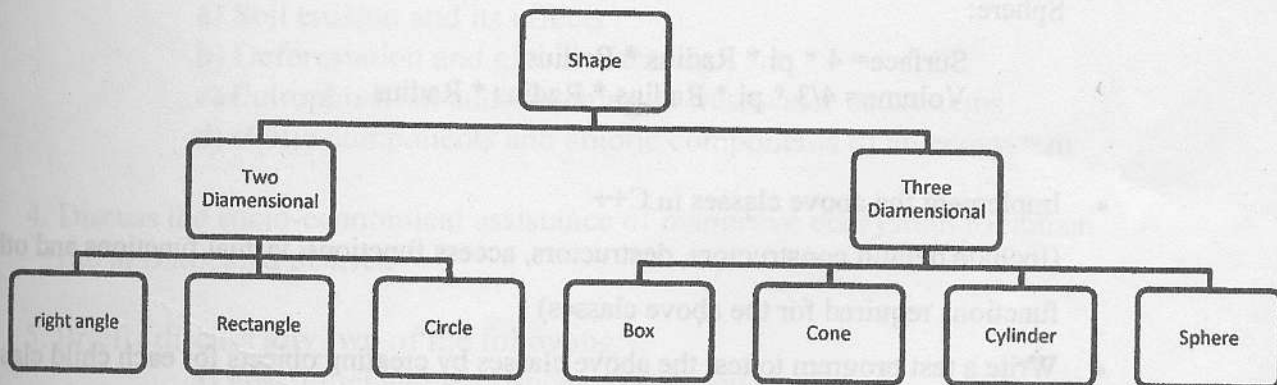
SECOND SEMESTER (Oct. /Nov., 2010)

CS153 - Practical work on CS104

Answer all questions

Time: 2 Hours

1. Consider the following class hierarchy:



The classes **Two-dimensional** and **Three-dimensional** should be defined as abstract classes. `toString()` should be defined for each Figure to returns the "Kind of Figure" and the relevant data for that Figure as String.

The class **Two-dimensional** contains the methods `getArea()` and `getCircumference()`.

Where

Triangle:

$$\text{Area} = \frac{1}{2} * \text{Height} * \text{Width}$$

$$\text{Circumference} = \text{Height} + \text{Width} + (\text{Height}^2 + \text{Width}^2)^{1/2}$$

Rectangle:

$$\text{Area} = \text{Height} * \text{Width}$$

$$\text{Circumference} = 2 * (\text{Height} + \text{Width})$$

Circle:

$$\text{Area} = \pi * \text{Radius} * \text{Radius}$$

$$\text{Circumference} = 2 * \pi * \text{Radius}$$

The class Three-dimensional contains the methods **getSurface()** and **getVolume()**.

Where

Box:

$$\text{Surface} = 2 * (\text{Height} * \text{Width} + \text{Width} * \text{Length} + \text{Length} * \text{Height})$$

$$\text{Volume} = \text{Height} * \text{Width} * \text{Length}$$

Cone:

$$\text{Surface} = 2 * \pi * \text{Radius} (\text{Radius} + \text{Height})$$

$$\text{Volume} = 1/3 * \pi * \text{Radius} * \text{Radius} * \text{Height}$$

Cylinder:

$$\text{Surface} = 2 * \pi * \text{Radius} (\text{Radius} + \text{Height})$$

$$\text{Volume} = \pi * \text{Radius} * \text{Radius} * \text{Height}$$

Sphere:

$$\text{Surface} = 4 * \pi * \text{Radius} * \text{Radius}$$

$$\text{Volume} = 4/3 * \pi * \text{Radius} * \text{Radius} * \text{Radius}$$

- Implement the above classes in C++

(Include default constructors, destructors, access functions, virtual functions and other functions required for the above classes)

- Write a test program to test the above classes by creating objects for each child class

(70 marks)

2. Write a C++ program to **sum, subtract and multiply two rational numbers** operators:

Operator+;

Operator-;

Operator*.

(30 marks)