SMA5231 Tech & Tools, C++ Problem Set 3

Due date: Tuesday, 2 Augest 2005

1. In this programming exercise, we consider the problem of defining a matrix class and show some of its use. The matrix class should be defined with practical use for linear algebra type of problems in mind. It should be convenient to use, efficient, robust, and simple.

Some implementation issues will be discussed before programming, such as memory allocation, argument passing when used in functions; should we check for index out-of-bound? which operations should operator overloaded? etc.

2. This exercise is to let you famNilarize the concept of virtual functions. The program read from a file specification of a list of two-dimensional shapes. It store the shapes in an array of shape pointers. The program then computes and prints the area of each shapes, as well as calculates the total areas of all the shapes. Use operator overloaded `<<` and `>>` to read and write, and use virtual function `s.area` or `sp -> area` to compute area. The input file should be in the form of `"shape-name" parameters`, one shape per line, for example

```
"circle" 2.3
"arc" 1.2 150
"triangle" s1 s2 s3
"square" 3.0
"polygon" 5 x1 y1 x2 y2 x3 y3 x4 y4 x5 y5
 ...
```

Other formats of data file are possible. Design your input file format consistent with your program. Your program should at least be able to handle the above 5 type of shapes.