

# Homework Assignment 5

CSE 399 C++, Spring 2007

Name:

Due: Monday, Mar 19<sup>th</sup> at noon.

**Assumptions:** For all of these problems you may assume the following

- `sizeof(int) = 4`; `sizeof(short) = 2`; `sizeof(char) = 1`; all pointers require 4 bytes
- The stack starts at address 100 and grows up.
- The heap starts at address 400 and grows up.
- ??? represents an unknown/uninitialized value.

Given the following code:

**Question 1 (32 points):**

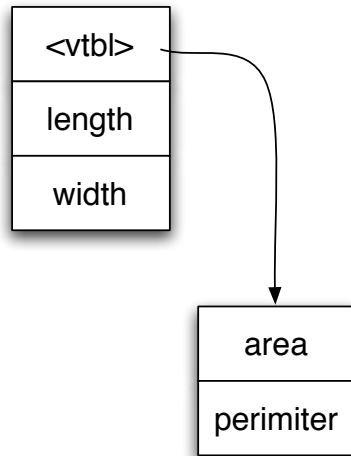
```
int x = 3;          /* x is at address 100 */
int y = 4;          /* y is at address 104 */
int & r = x;        /* r is at address 108 */
int * p = &r;       /* p is at address 112 */
/* Location 1 */
r = 6;
/* Location 2 */
r = y;
y = 11;
/* Location 3 */
*p = 12;
/* Location 4 */
```

Fill in the following table with the values of x, y, r, and p at the above indicated 4 locations:

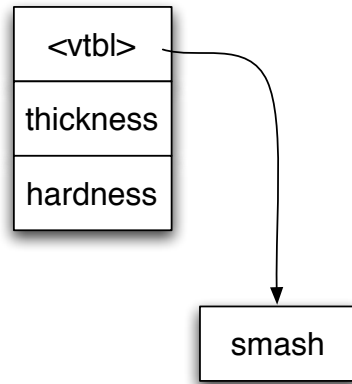
	Loc 1	Loc 2	Loc 3	Loc 4
x				
y				
r				
p				

**Question 2 (36 points):** Class `Rectangle` has fields `length` and `width`, as well as virtual methods `area` and `perimeter`. Class `Material` has fields `thickness` and `hardness` as well as virtual method `smash`. Class `Surface` extends `Rectangle` (which is its primary parent) and `Material`. The object layout for `Rectangle` and `Material` are as follows:

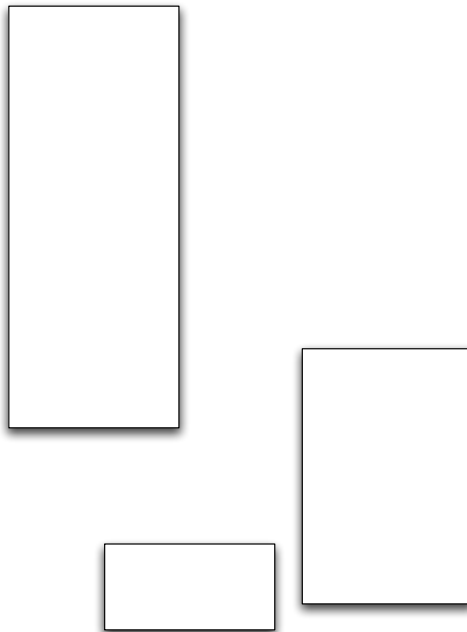
A Rectangle Object



A Material Object



Draw the layout of a Surface object.



**Question 3 (22 points):** Given the object layout of Material, Rectangle, and Surface objects from question 2, Suppose that in the following code, the Surface object is allocated at adress 400 (i.e.  $s = 400$ )

```
Surface * s = new Surface();
```



