Lyell Read

CS 161 Recitation

Quiz #7

1. (2 pts) Explain two differences between a pointer and a reference.

- A pointer is a different "type" It must be used as "int * var" not "int & var"
- A pointer is a memory address, while a reference holds the value for a variable.

2. (8 pts) What will each piece of code below do or print? (show your work, **they will all compile**):
   Do not panic! Take your time and work through each code sample.

2.1.
```
int a(int i){
    return i + a(i-1);
}
cout << a(4);
```

will not complete, as no edge/base case.

$4 + a(3) \quad 2 + a(1) \quad 0 + a-1$
$\underbrace{3 + a(2)} \quad \underbrace{1 + a(0)}$

2.2.
```
int b(int i){
    if( i == 0 )
        return 1;
    return i * b(i-1);
}
cout << b(4);
```

Prints 24

$b(4) = 4 \times \overbrace{[b(3)]}^{24} \| \quad b(2) = \overbrace{2 \cdot [b(1)]}^{2} \| \quad b(0) = 1$

$b(3) = \underbrace{3 \times [b(2)]}_{6} \| \quad b(1) = \underbrace{1 \cdot [b(0)]}_{1}$

2.3.
```
int c(int i){
    if( i > 3 )
        return 1;
    return i + c(++i);
}
cout << c(0);
```

Prints 7

$c(0) = 0 + \overbrace{[c(1)]}^{} \| \quad c(2) = 2 + \overbrace{[c(3)]}^{6} \| \quad c(4) = 1$

$c(1) = \underbrace{1 + [c(2)]}_{7} \| \quad c(3) = \underbrace{3 + [c(4)]}_{4}$

2.4.
```
int c(int i){
    if( i > 3 )
        return 1;
    return i + c(i++);
}
cout << c(3);
```

Infinite Looping - post increment

$c(3) = \underbrace{i + c(3)}_{i + c(3)} \quad c(3) + i \searrow \dots$

never exceeds 3

3. **Extra Credit: (1 pt)** Provide an example of how you would create an integer on the heap and assign it the value of 8.

int * heap = new int;

*heap = 8; // brief