

CS100 Midterm Exam Cover Sheet
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Answer sheet

Problem 1: **Question 1:** Choices 1, 2, and 3.
 Question 2: All choices apply.
 Question 3: Choices 1 and 2.
 Question 4: Choices 3 and 4 apply.

Problem 2: **Question 1:** 11 bytes. The string consists of 10 visible characters (including blank spaces and the period) plus the null character '\0' at the end.
 Question 2: Call-by-value and call-by-reference.
 Question 3: Composition and Aggregation.
 Question 4: The purpose of include guards is to prevent duplicate declarations if—even if indirectly—the same header is included twice for one source file.

Problem 3: The output is:

```
a = 2, b = 2
a = 4, b = 2
a = 2, b = 2
a = 6, b = 4
Result = 10
```

Problem 4:

Error 1: The pointer variable tmp is used without initialization. It should be changed to a char variable. (Note: Some compilers may produce working code. But it is still an error.)

Error 2: When n is > 0, assigning pointer variable q to (s+n) will make it point to the null character, rather than the last visible character in the string. Thus, (s+n) should be replaced by (s+n-1).

An example of a correct function is:

// This function reverses the characters in a string

```
void reverse(char *s)
{
    int n;
    char tmp;
    char *p, *q;
    n = strlen(s);
    q = (n > 0) ? (s+n-1) : s;
    for (p=s; p < q; ++p, --q) {
        tmp = *p;
        *p = *q;
        *q = tmp;
    }
}
```

Problem 5: a)

```
class Square : public Shape {
public:
    Square( float size );
    virtual ~Square();

    virtual float Area();
private:
    float m_size;
};
```

b)

```
Square::Square( float size ) {
    m_size = size;
}
Square::~~Square() {}

float
Square::Area() {
    return m_size*m_size;
}
```