

## MASTER LEVEL QUESTIONS

1. Define two unary functions

$$f(x) = x \text{ AND } x$$

$$g(x) = x \text{ XOR } x$$

Which of the following must be true?

i.  $f(g(x)) = g(f(x))$

ii.  $f(f(x)) = f(x)$

iii.  $g(g(x)) = g(x)$

A. i only

B. ii only

C. ii and iii only

D. i, ii and iii

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2. Consider the following function:

```
int same(int a, int b) {  
    if (____X____)  
        return 1;  
    else  
        return 0;  
}
```

Which of the followings can be filled in X such that the function returns 1 if and only if  $a = b$ ?

i.  $(a \mid b) == (a \& b)$

ii.  $(a \wedge b) == 0$

A. None of the above

B. i only

C. ii only

D. I and ii

3. Complete the function f(x) so that the function g(ch) can convert lowercase letters to uppercase and vice versa. For example, g('A') should return a and g('q') should return Q. Fill in Y.

```
int f(int x) {  
    return _____Y_____;  
}  
char g(char ch) {  
    int tmp;  
    tmp = (int)ch;  
    tmp = f(tmp);  
    return (char)tmp;  
}
```

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