

PRACTICE TEST 2, CS 101

- (1) Consider the following function declaration:

```
int sum(int);
```

The function `sum` should take as input an integer `n` and return the value 0 if `n <= 0`. If `n > 0`, the value returned should be the sum $1+2+3+\dots+(n-1)+n$ of the first `n` positive integers. Write the definition of the function `sum` in the space below.

- (2) Consider the following function declaration:

```
int num_days (int);
```

This function should take as input an integer `m` and return the number of days in month `m` in a non leap year. (For January, `m` is 1, and for February `m` is 2 and so forth.) If `m` is not a valid number of a month, `num_days` should return 0. So if `m` is 1,3,5,7,8,10 or 12, `num_days` should return 31. If `m` is 2, `num_days` should return 28. If `m` is 4,6,9 or 11, `num_days` should return 30. And otherwise `num_days` should return 0.

Write the function definition in the space below:

- (3) Consider the following program. Write the output of the program in the space given below.

```
#include <iostream.h>
int f(int);
void main() {
    cout << f(3) << endl;
}
int f(int m){
    cout << m << " ";
    if (m)
        return m + f(m-1);
    else
        return 0;
}
```

- (4) Mark each of the following logical expressions as either true or false. You can assume we have declared

```
int x=1, y=2, z=4;
```

Expression	true	false
(x>=1)		
(z==y*y)		
((z<5) (y+x<z))		
(!(x==1) && (y==2))		
(y==++x)		

- (5) Consider the following program. What is the output? Put your answer in the space below.

```
#include<iostream.h>
void main() {
    int a=3, x=2;
    do{
        cout << a << " " << x << endl;
        if (a==1) a--;
        a--;
        x += a*a;
    } while ((a!=0) && (x<9));
}
```

- (6) What is the output? Write your answer in the space below.

```
#include<iostream.h>
void rotate (int&, int&, int&);
void main() {
    int a=1, b=2, c=3;
    rotate(a,b,c);
    cout << a << " " << b << " " << c << endl;
}
void rotate (int& x, int& y, int& z){
    int temp = x;
    x = y; y = z; z = temp;
}
```

Multiple choice: circle the letter of the correct answer.

- (7) What is the returned value of the function `f`?
- ```
int f(int x, int y){return (x>y) ? x : y; }
```
- (a) The sum `x + y`.
  - (b) The difference `x - y`.
  - (c) The maximum of `x` and `y` (i.e. the value of the larger of `x` and `y`).
  - (d) The minimum of `x` and `y` (i.e. the value of the smaller of `x` and `y`).
- (8) Consider a function `g` which itself does not output anything to the screen. If `g` is sent into an infinite recursion, what will happen upon execution on `pegasus`?
- (a) The computer will print an error message to the screen and return to the `pegasus` prompt.
  - (b) The computer will do nothing.
  - (c) The computer will hang (it will appear to do nothing and will not return to the `pegasus` prompt).
  - (d) The computer will start to smoke.
- (9) The following code fragment prints out \_\_\_\_\_ asterisks.
- ```
for (char c='a'; c <= 'd'; c++) cout << '*';
```
- (a) 0
 - (b) 2
 - (c) 3
 - (d) 4
- (10) Consider the following program. What is the output?
- ```
#include<iostream.h>
void main(){
 bool a=false;
 for (int b=1; b<=3; b++){
 a = !a;
 if (a) cout << '+';
 }
 if (a) cout << '-';
}
```
- (a) ++
  - (b) +-
  - (c) ++-
  - (d) +

(11) Consider the following functions:

```
void spaces(int m){
 for (int i=1; i<=m; i++) cout << " ";
}
void line(int m){
 for (int i=1; i<=m; i++) cout << "*";
 cout << endl;
}
```

Which code fragment prints out the following pattern?

```

* *
* *
* *

```

- (a) `line(5);`  
`for (int i=1; i<=4; i++){`  
 `cout << "*"; spaces(3); cout << "*" << endl; }`  
`line(5);`
- (b) `line(5);`  
`for (int i=1; i<=3; i++){`  
 `cout << "*"; spaces(3); cout << "*"; }`  
`line(5);`
- (c) `line(5);`  
`for (int i=1; i<=3; i++){`  
 `cout << "*"; spaces(3); cout << "*" << endl; }`  
`line(5);`
- (d) `line(5);`  
`for (int i=1; i<=3; i++){`  
 `cout << "*"; spaces(4); cout << "*"; }`  
`line(5);`

(12) What is wrong with the following function definition?

```
void f(int n);
{
 while (n!=0) {
 n--;
 cout << n << endl;
 }
}
```

- (a) Nothing.
  - (b) It is possible for this function to go into an infinite loop.
  - (c) There should not be a semicolon after `void f(int n)`.
  - (d) Both (b) and (c).
- (13) In the following function definition, choose the keyword to fill in the blank so that the variable `a` is initialized to 1 the first time `f` is called, but after any return from `f`, the value of `a` is kept until the next time `f` is called:

```
void f(){
 ----- int a = 1;

 . . . body of the function . . .

}
```

- (a) `global`
- (b) `static`
- (c) `const`
- (d) `keep`

**Answers:**

(1) `int sum (int n){`

`int i, s = 0;`

`for (i = 1; i <= n; i++)  
s += i;`

`return s;`

`}`

(2) `int num_days (int m){`

`switch (m) {`

`case 1: case 3: case 5: case 7: case 8: case 10: case 12:`

`return 31;`

`case 4: case 6: case 9: case 11:`

`return 30;`

`case 2:`

`return 28;`

`default:`

`return 0;`

`} }`

(3) 3 2 1 0 6

(4) true, true, true, false, true

(5) 3 2

2 6

1 7

-1 8

(6) 2 3 1

(7) (c)

(8) (a)

(9) (d)

(10) (c)

(11) (c)

(12) (d)

(13) (b)