Instructions: This assignment is concerned with functions and parameter-passing in C++. The answers to the following questions can be deduced from the lectures and text (through section 6 of the notes and Chapters 7 and 8 of the text). You may also want to type in and run these programs to test your reasoning. Select the best answer for each question and mark in on the opscan form passed out with this assignment. Turn your completed opscan (be sure to code your name and ID number) in at my office or at class.

For questions 1 through 9, consider the following program and determine what value is printed for the indicated variable when the indicated function call is carried out.

```c
#include <iostream.h>
void Print(int Int1, int Int2);
void main() {
    int a = 0, b = 7, n = 3;
    Print(5, n); // call 1
    Print(n, n); // call 2
    Print(n * n, 12); // call 3
}

void Print(int a, int b) {
    int c;
    a = 2*a;
    b = b + 1;
    c = 2 * a + b;
    cout << a << ' ' << b << ' ' << c << endl;
}
```

1) variable a in call 1
   a) 0   b) 5   c) 7   d) 10   e) none of the above

2) variable b in call 1
   a) 3   b) 4   c) 7   d) 14   e) none of the above

3) variable c in call 1
   a) 3   b) 14   c) 21   d) 34   e) none of the above

4) variable a in call 2
   a) 0   b) 3   c) 6   d) 8   e) none of the above

5) variable b in call 2
   a) 3   b) 5   c) 7   d) 8   e) none of the above

6) variable c in call 2
   a) 3   b) 17   c) 20   d) 21   e) none of the above

7) variable a in call 3
   a) 9   b) 25   c) 50   d) 64   e) none of the above

8) variable b in call 3
   a) 4   b) 6   c) 7   d) 8   e) none of the above

9) variable c in call 3
   a) 54   b) 56   c) 106   d) 132   e) none of the above
For questions 10 through 12, consider the following program and determine what value (don’t worry about formatting) is printed for the indicated variable.

```c
#include <iostream.h>

void SwapEm(int Int1, int& Int2); 
int tmp = 0;

void main() { 
    int a = 4, b = 23;
    SwapEm(a, b);
    cout << a << endl;
    cout << b << endl;
    cout << tmp << endl;
}

void SwapEm(int oneth, int& twoth) {
    int tmp;
    tmp = oneth;
    oneth = twoth;
    twoth = tmp;
}
```

10) variable a
   a) 0   b) 4   c) 2   d) 23   e) none of the above

11) variable b
    a) 0   b) 4   c) 7   d) 23   e) none of the above

12) variable tmp
    a) 0   b) 4   c) 9   d) 23   e) none of the above

For questions 13 through 15 consider the following program and determine what value (don’t worry about formatting) is printed for the indicated variable.

```c
#include <iostream.h>

float Quad(float x, float a, float b, float c);

doem main() {
    float x = 5.0f, y = 0.0f;
    float a = 0.0f, b = 0.0f, c = 0.0f;
    y = Quad(x, 3.0, 2.0, 1.0);
    cout << a << endl;
    cout << x << endl;
    cout << y << endl;
}

float Quad(float x, float a, float b, float c) {
    float fval;
    fval = a*x*x + b*x + c;
    return fval;
}
```

13) variable a
   a) 0.0   b) 5.0   c) 26.0   d) 86.0   e) none of the above

14) variable x
    a) 0.0   b) 5.0   c) 26.0   d) 86.0   e) none of the above

15) variable y
    a) 0.0   b) 5.0   c) 26.0   d) 86.0   e) none of the above
For questions 16 through 18 consider the following program and determine what value (don’t worry about formatting) is printed for the indicated variable.

```cpp
#include <iostream.h>
int SumIt(int& n, int& sum);
void main() {
    int n = 5, sum, t = 1;
    t = SumIt(n, sum);
    cout << n << endl;
    cout << sum << endl;
    cout << t << endl;
}

int SumIt(int& n, int& sum) {
    sum = 0;
    while (n >= 1) {
        sum = sum + n;
        n = n - 1;
    }
    return 2;
}
```

16) variable n
   a) 0  b) 2  c) 5  d) 10  e) none of the above

17) variable sum
   a) 0  b) 2  c) 5  d) 10  e) none of the above

18) variable t
   a) 0  b) 2  c) 5  d) 10  e) none of the above

For questions 19 and 20 consider the following program and determine what value (don’t worry about formatting) is printed for the indicated variable.

```cpp
#include <iostream.h>
float Test(float x, float y, float z);
void main() {
    float a, b, c, result = 1.0;
    a = -3.2;
    b = 1.2;
    c = 1.0;
    result = Test(5.2, 5.3, 5.6);
    cout << result << endl;
    result = Test(a, b, c);
    cout << result << endl;
}

float Test(float x, float y, float z) {
    if (x > y || y < z)
        return 3.14;
    else
        return 2.72;
}
```

19) variable result after the first call to Test( )
   a) 0.0  b) 1.0  c) 2.72  d) 3.14  e) none of the above

20) variable result after the second call to Test( )
   a) 0.0  b) 1.0  c) 2.72  d) 3.14  e) none of the above
For questions 21 through 25 consider the following program, which reads a ternary (base 3) number from standard input and writes its decimal (base 10) value to standard output, checking to be sure that all the ternary digits read in are valid (0, 1 or 2). Note the use of the builtin function isdigit(ch) which returns true if ch is a digit ('0' through '9') and false otherwise. We need to include ctype.h for the definition of isdigit().

```c
#include <iostream.h>
#include <ctype.h>
int GetTernary( );
int Value(char digit);
void main() {
    int DecValue;
    DecValue = GetTernary( );
    if (DecValue >= 0)
        cout << DecValue;
}

int Value(char digit) {
    switch (digit) {
    case '0': return  0;
    case '1': return  1;
    case '2': return  2;
    default : return -1;
    }
    number = 3*number +
    Value(digit);
    cin.get(digit);
    return number;
}

int GetTernary( ) {
    char digit;
    int number = 0, cvtval;
    cin.get(digit);
    while ( isdigit(digit) ) {
        cvtval = Value(digit);
        if (cvtval == -1) {
            cout << "Bad input!";
            return -1;
        }
        number = 3*number +
        Value(digit);
        cin.get(digit);
    }
    return number;
}
```

21) What is output by this program if the input is: 111
   a) 3       b) 13      c) 111     d) Bad input!     e) none of the above

22) Which of the following input values would produce the output: 43
   a) 7       b) 221     c) 1121   d) Can’t be done   e) none of the above

23) What is output by the program if the input is: 123
   a) 6       b) 18      c) 123    d) Bad input!     e) none of the above

24) What is the value assigned to DecValue if the input is: 123
   a) 6       b) 18      c) 123    d) Bad input!     e) none of the above

25) Would the function GetTernary() produce the same results, given the input 111, if each occurrence of the line
    cin.get(digit);
    were replaced by:  cin >> digit;
    a) yes      b) no
For questions 26 and 27, consider the following program, which illustrates the use of a file-scoped variable as the temporary workspace for user-defined functions.

```c
#include <iostream.h>

int temp;

int GetMax(int X, int Y);
int GetMiddle(int X, int Y, int Z);

void main() {
    int A, B, C;
    A = 1; B = 2; C = 3;
    cout << GetMiddle(A, B, C) << endl;
    cout << GetMiddle(C, B, A) << endl;
}

int GetMiddle(int X, int Y, int Z) {
    temp = GetMax(X, Y);
    return GetMax(Z, temp);
}

int GetMax(int X, int Y) {
    temp = X;
    if (X >= Y)
        return X;
    else
        return temp;
}
```

26) What value is printed by the first output statement?
   a) 1  b) 2  c) 3  d) a runtime error will occur  e) none of the above

27) What value is printed by the second output statement?
   a) 1  b) 2  c) 3  d) a runtime error will occur  e) none of the above

Questions 28 through 30 consider the following function.

```c
double sqroot(double x) {
    return (x/2.0 + 1.0/x);
}
```

28) What value is returned from the call: `sqroot(2)`
   a) 1  b) 1.0  c) 1.5  d) a runtime error will occur  e) none of the above

29) What value is returned from the call: `sqroot(2.0)`
   a) 1  b) 1.0  c) 1.5  d) a runtime error will occur  e) none of the above

30) Approximately, what value is returned from the call: `sqroot(sqroot(2.0))`
   a) 1.4167  b) 1.5  c) 2.25  d) a runtime error will occur  e) none of the above