Part I: Multiple Choice (18 points)

Answer all of the following questions. READ EACH QUESTION CAREFULLY. Fill the correct bubble on your mark-sense sheet. Each correct question is worth **2 points**. Choose the one BEST answer for each question. Assume that all given C code is syntactically correct unless a possibility to the contrary is suggested in the question.

Remember not to devote too much time to any single question, and good luck!

1. Given the following C program,

```
int myfunction(int param) {
   int x;

   x = param * param;
   return (x);
}


int main(void) {
   int x, z;
   x = 3;
   z = 2 * myfunction(x);
   printf("x=%d z=%d", x, z);

   return (0);
}
```

   What is printed by the printf statement in main?

   A. x=3 z=3
   B. x=9 z=9
   C. x=3 z=18
   D. x=9 z=18
   E. x=3 z=9

2. **Which of the following statements is true about the relationship between the if-else construct and the switch construct in C?**

   A. Anything that can be done by a switch can be done with a single if-else statement (no nesting).
   B. Anything that can be done by a switch can be done with appropriately nested if-else statements.
   C. Anything that can be done by nested if-else statements can be done with a single switch.
   D. Both B and C are true.
   E. There is no relationship between the if-else construct and the switch construct in C.

3. **Consider the following program segment with while loop:**

```
int count = 0;
double sv = 1000.0;

while (count < 3 &&  sv > 100.0) {
    sv = sv * 0.2;
    count = count + 1;
}
```

What are the final values of count and sv when the loop finishes executing?

A. count = 3, sv = 8.0
B. count = 2, sv = 8.0
C. count = 2, sv = 40.0
D. count = 4, sv = 1.6
E. count = 0, sv = 1000.0

4. **Consider the following C program:**

```
int main(void) {
    int height[5];
    int j;

    height[0] = 2;

    for (j = 1; j < 5; j = j + 1) {
        height[j] = height[j-1] * j;
    }

    return (0);
}
```

What is the final value of height[4] after execution of the for loop?

A. 2
B. 4
C. 12
D. 48
E. 240

5.   **Suppose we have the following program segment:**

```
double z;
double *zp;
z = 5.0;
zp = &z;
scanf("%lf", zp);
```

Which of the following statements is true of the execution of this segment?

A.   It does not execute due to a syntax error in the call to scanf.
B.   zp contains the value typed in by the user and z contains 5.0.
C.   zp contains the address of z and z contains the value typed in by the user.
D.   zp contains a garbage value and z contains 5.0.
E.   zp contains the address of a local variable in scanf and z contains 5.0.

6.   **Given the following Boolean expression, which values of the variables make it evaluate as true?**

```
( ( !p && x > y ) || ( p && y > z ) )
```

A. $p = 1, x = 7, y = 5, z = 6$
B. $p = 0, x = 6, y = 5, z = 7$
C. $p = 1, x = 6, y = 5, z = 7$
D. $p = 0, x = 5, y = 6, z = 7$
E. $p = 1, x = 5, y = 6, z = 7$

7. How many times is "HI" printed by the code below?

```
int change(int i) {
    return (2 * i);
}

int main(void) {
    int k;

    k = 1;
    while (k < 10) {
        printf("HI\n");
        k = change(k);
    }

    return (0);
}
```

  A. 2 times
  B. 3 times
  C. 4 times
  D. 5 times
  E. 10 times

8. Which of the following logical formulas is equivalent to the following formula?

```
!((x > y) && (p || m == n))
```

  A. (x <= y) && (p && m != n)
  B. (x <= y) && (!p || m != n)
  C. (x <= y) || (!p && m != n)
  D. (x <= y) || (!p || m != n)
  E. none of the above

9. What output does the following program print when it is executed?

```
int confuse(int *x, int y) {
   *x = *x + y;
   y = 2 * y;
   return (y);
}

int main(void) {
   int x, y, z;
   x = 3;
   y = 2;
   z = confuse(&y, x);
   printf("x=%d  y=%d  z=%d\n", x, y, z);
   return (0);
}
```

A. x=3 y=5 z=4
B. x=6 y=5 z=6
C. x=3 y=5 z=6
D. x=5 y=2 z=4
E. x=5 y=4 z=4

Part II: Programming Questions (25 points)
Write C code for the following two problems:

10. (10 points) Write a function named `fsum` with one integer parameter n that returns the (integer) sum of the first n positive integers. For example, `fsum(5)` would add up 1 + 2 + 3 + 4 + 5 and would return 15.

Now write a main program that uses this function to compute the difference between the sum of the first 50 integers and the sum of the first 30 integers and prints the result. The main program MUST use the function and must not do the summation itself.

11. (15 points) Wally's Widget Works sells widgets. The price of every widget in an order depends on total number of widgets ordered as follows:

total # widgets	*price of each widget*
1-9	**$12.50**
10 or more	**$10.00**

A widget order consists of a customer number and number of widgets ordered. Write a program that reads, processes, and prints widget orders. For each order, the program should print the customer number, the number of widgets ordered, and the total cost of the order. Use doubles for prices and costs and don't worry about rounding (different from Homework 3!). The end of the input is indicated by an order that has a customer number of 0, and the quantity for that order is ignored. (You do not need to check input values, i.e. assume all input numbers are non-negative.)

In this example execution, the user input is underlined:

```
1234  20
Customer 1234, 20 widgets, cost $200.00
5678  4
Customer 5678, 4 widgets, cost $50.00
0  0
```