

1. Record your answers on SCANTRON form **882-E (It is green!)**
2. Print your name on your scantron in the space labeled **NAME**.
3. Print **CMSC 1613** in the space labeled **SUBJECT**.
4. Print the date, **7-13-2011**, in the space labeled **DATE**.
5. Print your **CRN, 32359**, in the space labeled **PERIOD**.
6. Print the test number and version, **T2/V2**, in the space labeled **TEST NO**.
7. You may not consult your neighbors, colleagues, or fellow students to answer the questions on this test.
8. Mark **all** the selections that satisfy the question. If selections **b** and **c** are valid answers to the question, then mark selections **b** and **c**.
9. Darken your selections completely. Make a heavy black mark that completely fills your selection.
10. Answer all **30** questions.
11. Submit your completed scantron at **4:15 p.m.** on **Wednesday, July 13, 2011** in MCS 115.

1. Mark correct statements that pertain to the program shown in figure 1.
 - a. Identifier *a* is an argument.
 - b. Identifier *r* is a value parameter.
 - c. Identifier *v* is a reference parameter.
 - d. Identifier *p* is a function.

```
1.  #include <iostream>
2.  using namespace std;
3.  void p(int& r){r++;}
4.  void q(int v){v++;}
5.  void Count(void)
6.  {   int a=0;
7.      while (a<10) {
8.          p(a); q(a);
9.      }
10. }
11. int main()
12. {   Count();
13.     return 0;
14. }
```

Figure 1. Program for question 1.

2. Which of the following equivalencies is correct?
 - a. $3243_{10} = \text{dab}_{16}$
 - b. $2989_{10} = \text{bad}_{16}$
 - c. $2766_{10} = \text{ace}_{16}$
 - d. $3499_{10} = \text{cab}_{16}$

3. The grammar for a while-statement is

while-statement:
while (expression) statement

Which flowchart best describes the flow of control for a *while-statement*?

- a. Figure 3 d
- b. Figure 3 c
- c. Figure 3 a
- d. Figure 3 b

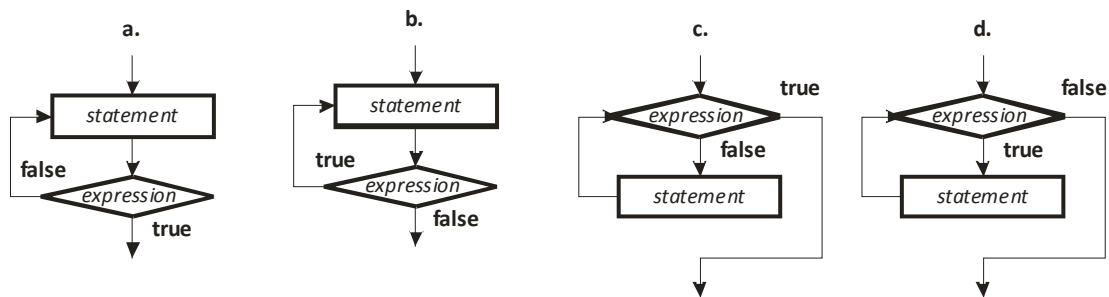


Figure 3. *while-statement* flowcharts for question 3.

4. How many times are the statements on line 8 executed in program shown in figure 4?

- a. 10
- b. 11
- c. 9
- d. 5

```

1. #include <iostream>
2. using namespace std;
3. void p(int& r){r++;}
4. void q(int v){v++;}
5. void Count(void)
6. { int a=0;
7.   while (a<10) {
8.     p(a); q(a);
9.   }
10. }
11. int main()
12. { Count();
13.   return 0;
14. }
  
```

Figure 4. Program for question 4.

5. How many elements do mathematicians say there are in the set of real numbers?
- 2^{64}
 - 2^{32}
 - 2^{16}
 - ∞ , an infinite number
6. What is the monthly payment on a loan of \$75,000 at an APR of 7.125 for 15.5 years?
- \$667.14
 - \$679.37
 - \$672.45
 - \$684.65
7. Which variable declarations contain no errors or warnings?
- signed long c ;**
 - signed long double d ;**
 - unsigned short int a ;**
 - signed char b ;**
8. A certain financial institution offers accounts that pay simple interest at the rate of 8.25 APR. Determine the amount of money in an interest bearing account one year after \$1025.10 was deposited.
- \$1112.94
 - \$1107.11
 - \$1109.67
 - \$1107.00
9. Variables b , c , and d have type **int**. Which selection lists the operations in the order in which they are executed in the expression $(-b+c*d)$?
- $+ - *$
 - $* - +$
 - $- * +$
 - $- + *$
10. Which of the following directives is properly formed?
- #include {iostream}**
 - #include [iostream]**
 - #include (iostream)**
 - #include <iostream>**

11. Consider the grammar for a *for-statement* given below. Which flowchart best describes the flow of control for a *for-statement*?

for-statement :

for (*initialization-expression*; *conditional-expression* ; *increment-decrement-expression*)
statement

- a. Figure 11 d.
- b. Figure 11 a.
- c. Figure 11 c.
- d. Figure 11 b.

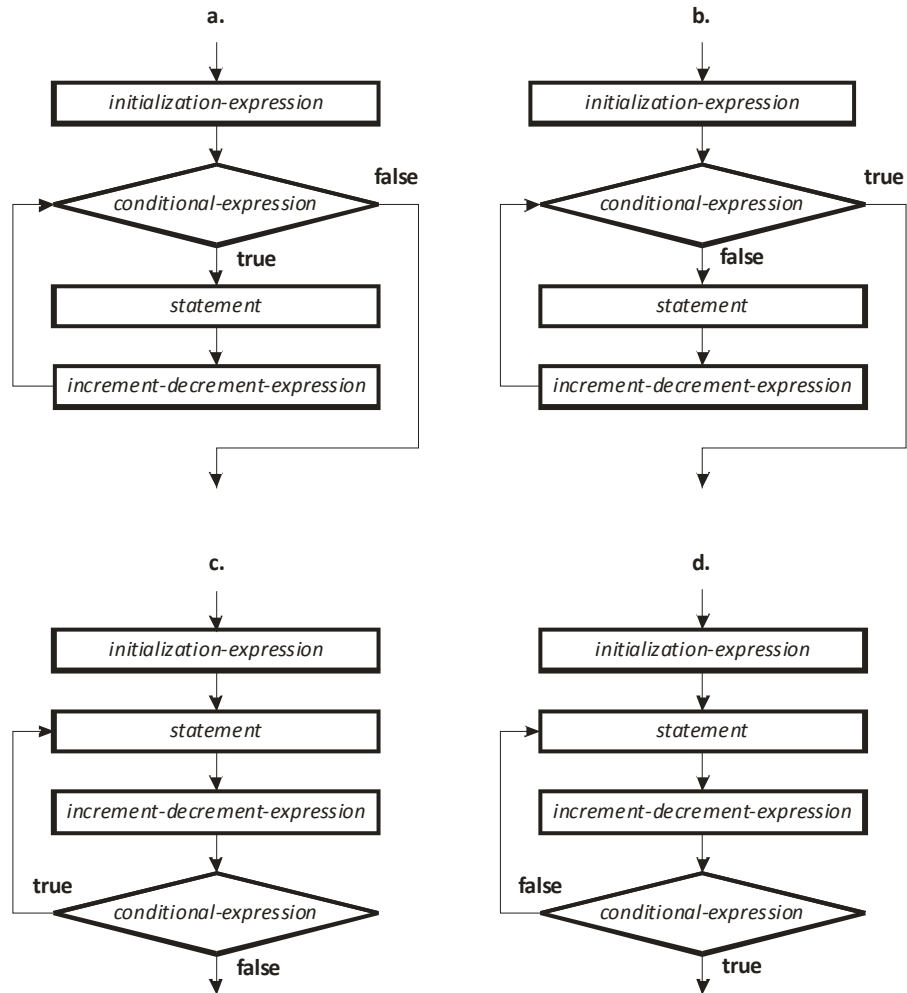


Figure 11. *for-statement* flowcharts for question 11.

12. What is the size and range of variable *i* of type **int** using the g++ compiler on the department computer that executes under the control the Linux operating system?

- a. 2 bytes, $-65,536 \leq i \leq 65,535$
- b. 32 bits, $-2^{31} \leq i \leq 2^{31} - 1$
- c. 16 bits, $-32,768 \leq i \leq 32,767$
- d. 4 bytes, $-2,147,483,648 \leq i \leq 2,147,483,647$

13. The grammar for a *do-statement* is

do-statement:

do *statement* **while** (*expression*) ;

Which flowchart best describes the flow of control for a *do-statement*?

- a. Figure 13 a
- b. Figure 13 c
- c. Figure 13 d
- d. Figure 13 b

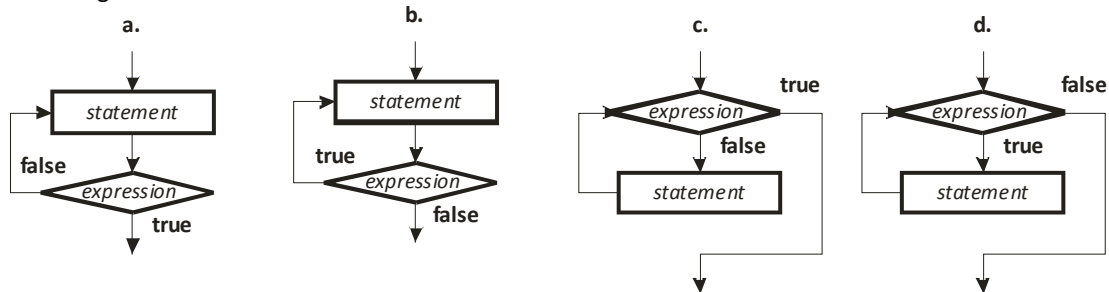


Figure 13. do-statement flowcharts for question 13.

14. Variables *a* and *b* have type **bool**. What values of *a* and *b* make the expression **!(a&&b)==!a||!b** true?

- a. The expression is never true.
- b. **a=false, b=false**
- c. **a=false, b=true**
- d. The expression is always true.

15. Mark correct statements.

- a. When expression is passed by reference the corresponding parameter becomes an alias for that variable.
- b. An expression can be passed by reference.
- c. An expression can be passed by value.
- d. When variable is passed by value the corresponding parameter becomes an alias for that variable.

16. Which of the following sets is a subset of the set of real numbers?
- a. the set rational numbers
 - b. the set real numbers.
 - c. the set of complex numbers
 - d. the set integers
17. Variables n and d have type `int`. What values of n and d make the expression $(n/d)*d==n$ true?
- a. $n=35, d=7$
 - b. $n=4, d=3$
 - c. $n=1, d=2$
 - d. $n=5, d=2$
18. What is printed by the program in figure 18?
- a. $a=1\ b=2\ a=1\ b=2$
 - b. $a=2\ b=1\ a=1\ b=2$
 - c. $a=1\ b=2\ a=2\ b=1$
 - d. $a=2\ b=1\ a=2\ b=1$

```
#include <iostream>
#include <iomanip>
using namespace std;
void Exch(int& m,int& w){int b=m;m=w;w=b;}
void Swap(int m,int w){int b=m;m=w;w=b;}
void Print(ostream& o,int a,int b) {o << " a=" << a << " b=" << b;}
int main()
{   int a(1),b(2);
    Swap(a,b);
    Print(cout,a,b);
    Exch(a,b);
    Print(cout,a,b);
    cout << endl;
    return 0;
}
```

Figure 18. Program for question 18.

19. Variables b , c , d , and e have type **bool**. Which selection lists the operations in the order in which they are executed in the expression $(b || c == d \&\& e)$?

- a. $|| == \&\&$
- b. $\&\& || ==$
- c. $\&\& == ||$
- d. $|| \&\& ==$

20. How many times is the expression $(b > 'a')$ on line 10 in the program shown in figure 20 evaluated?

- a. 28
- b. 40
- c. 32
- d. 35

```
1.  #include <iostream>
2.  #include <iomanip>
3.  using namespace std;
4.  int main()
5.  {
6.      char a('a'), b; int c(0);
7.      while (a < 'h')
8.      {
9.          b = 'e';
10.         while (b > 'a')
11.         {
12.             b--; c++;
13.         }
14.         a++;
15.     }
16.     cout << endl << "a=" << a << " b=" << b << " c=" << c;
17.     cout << endl;
18.     return 0;
19. }
```

Figure 20. Program for question 20.

21. Every complete statement is terminated by a

- a. # symbol
- b. semicolon
- c. period
- d. closing curly brace

22. Which selection accurately describes the grammar of a *conditional-statement*?

- a. *conditional-statement*:
 if *expression* **then** *statement*
 if *expression* **then** *statement* **else** *statement*
- b. *conditional-statement*:
 if (*expression*) *statement*;
 if (*expression*) *statement*; **else** *statement*;
- c. *conditional-statement*:
 if (*expression*) *statement*
 if (*expression*) *statement* **else** *statement*
- d. *conditional-statement*:
 if *expression* **then** *statement*;
 if *expression* **then** *statement*; **else** *statement*;

23. What is printed by program in figure 23?

- a. 9 viiii
- b. 9 viv
- c. 9 ix
- d. 9 viiiiii

```
#include <iostream>
#include <iomanip>
using namespace std;
void rv(int a,int d,char c)
{   while (a>=d) {
        a-=d; cout << c;
    }
}
void rm(int d)
{   rv(d,1000,'m');   rv(d,500,'d');   rv(d,100,'c'); rv(d,50,'l');
    rv(d, 10,'x'); rv(d, 5,'v');   rv(d, 1,'i');
}
int main()
{   cout << setw(4) << 9 << " ";
    rm(9);   cout << endl;
    return 0;
}
```

Figure 23. Program for question 23.

24. \$125.15 is deposited every month into an interest-bearing account for twenty (20) years. Interest is compounded monthly. The APR on the account is 7.25. How much money is in the account at the end of the term? (Please note that the last deposit is made one month before the entire sum is withdrawn and the first payment is made on the first day of the first term.)
- \$65,193.97
 - \$67,615.37
 - \$67,128.76
 - \$65,115.83
25. What is the present value of \$2150.25 promised to you one year from today given the existence of an account that pays simple interest at the rate of 5.4 APR?
- \$2040.09
 - \$2047.62
 - \$2047.86
 - \$2037.46
26. Suppose a value having type real is implemented using an IEEE 754 double binary floating-point representation as shown in figure 26. How many different values of type real can be represented?
- ∞ , an infinite number
 - 2^{64}
 - 2^{32}
 - 2^{16}

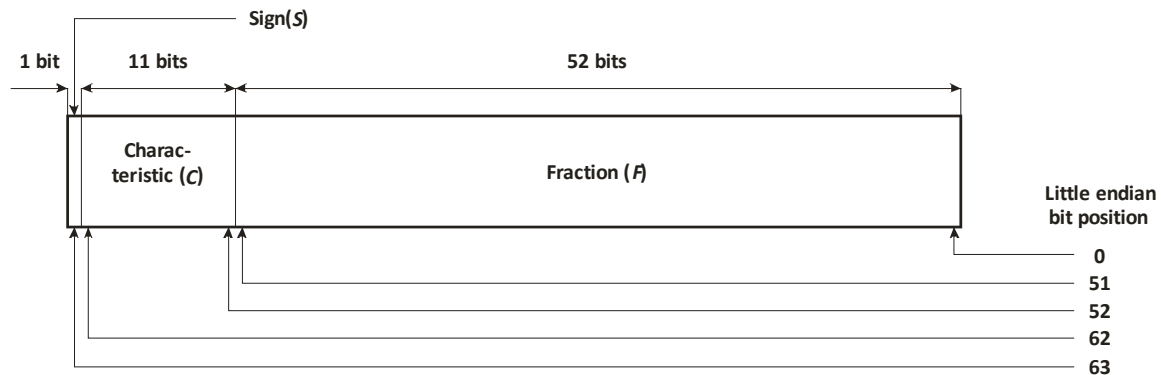


Figure 26. IEEE 754 double binary floating-point representation.

27. What is the identifier *c* in function *ToUpper* in figure 27?
- an actual parameter
 - an actual argument
 - a formal parameter
 - a formal argument

```
char ToUpper(char c) {if ('a'<=c&& c<='z') return c-'a'+'A'; else return c;}
```

Figure 27. Function for question 27.

28. What is printed by program in figure 28?

- a. 9 ix
- b. 9 viv
- c. 9 viiiiii
- d. 9 viiii

```
#include <iostream>
#include <iomanip>
using namespace std;
void rv(int& a,int d,char c)
{   while (a>=d) {
        a-=d; cout << c;
    }
}
void rm(int d)
{   rv(d,1000,'m');   rv(d,500,'d');   rv(d,100,'c'); rv(d,50,'l');
    rv(d, 10,'x'); rv(d, 5,'v');   rv(d, 1,'i');
}
int main()
{   cout << setw(4) << 9 << " ";
    rm(9);   cout << endl;
    return 0;
}
```

Figure 28. Program for question 28.

29. What is printed by program in figure 29?

- a. a=g b=a c=28
- b. a=h b=b c=28
- c. a=h b=a c=27
- d. a=h b=a c=28

```
#include <iostream>
#include <iomanip>
using namespace std;
int main()
{   char a('a'),b;int c(0);
    while (a<'h') {
        b='e';
        while (b>'a') {
            b--; c++;
        }
        a++;
    }
    cout << endl << "a=" << a << " b=" << b << " c=" << c;
    cout << endl;
    return 0;
}
```

Figure 29. Program for question 29.

30. What is printed by program in figure 30?

- a. w=6
- b. w=5
- c. w=22
- d. w=21

```
#include <iostream>
#include <iomanip>
using namespace std;
char* getnonblank(char* q){while (*q==' ') q++; return q;}
char* getblank(char* q)
{ while(*q!=' '){
    if (*q=='\0') break; else q++;
}
return q;
}
int main()
{ char s[]="Cows are of the bovine ilk.";
  char* p=s;
  int w=0;
  for (;;) {
    p=getnonblank(p);
    p=getblank(p);
    if (*p=='\0') break;
    w++;
  }
  cout << "w=" << w;
  cout << endl;
  return 0;
}
```

Figure 30. Program for question 30.