16 COMPUTER SCIENCE

COMPUTER SCIENCE–1

Where is the error in the following FORTRAN program?

```
670  READ L,M,N
680  DATA 33 40 60
690  PRINT L+M/N
700  PRINT L*N+M
800  END
```

(A) line 670 (B) line 680 (C) line 690 (D) line 700

Line 680 should have commas separating the data points.

The answer is (B).

COMPUTER SCIENCE–2

What is the output of the following FORTRAN program?

```
100  DATA 'June',15,1955
200  READ N$
300  DATA 1948
400  READ C,X,X1
500  PRINT X1,N$,X,C
```

(A) 15,1955,June,1955
(B) June 15 1955 1948
(C) 1948 June 1955 15
(D) 1948 June 15 1955

June is assigned to N$, 15 is assigned to C, 1955 is assigned to X, and 1948 is assigned to X_1. The output will be: 1948 June 1955 15.

The answer is (C).

COMPUTER SCIENCE–3

In the given program, what is the value assigned to N?

```
10  N=0
15  GO TO 50
20  FOR X=-1 TO 7
25  N=6
30  FOR Y=3 TO 6
35  N=X*Y+16
40  NEXT Y
45  NEXT X
50  PRINT N
55  END
```

(A) −3678 (B) −356 (C) 0 (D) 98

The statement of line 15 bypasses the loops, and N remains the value assigned to it in line 10: N=0.

The answer is (C).

COMPUTER SCIENCE–4

Determine the output of the given program.

```
10  FOR X=-1 TO 8 STEP 3
20  S=0
30  FOR Y=0 TO 4 STEP 2
40  S=S+X*Y+1
50  NEXT Y
60  PRINT S
70  NEXT X
80  END
```

(A) −5 15 18 24 (B) −3 15 33 51 (C) 0 17 23 84 (D) 72 12 21 28

S gets assigned a value three times during the first loop of X, and is then printed.

$$\left.\begin{array}{l} X = -1 \\ S = 0 \\ Y = 0 \end{array}\right\} \quad S = 0 + (-1)(0) + 1 = 1$$

$$\left.\begin{array}{l} X = -1 \\ S = 1 \\ Y = 2 \end{array}\right\} \quad S = 1 + (-1)(2) + 1 = 0$$

$$\left.\begin{array}{l} X = -1 \\ S = 0 \\ Y = 4 \end{array}\right\} \quad S = 0 + (-1)(4) + 1 = -3$$

This may be continued for the subsequent loop values of X. The corresponding S values printed are 15, 33, and 51.

The answer is (B).

COMPUTER SCIENCE–5

What are the respective values of A_1, A_2, and A_3, given the following assignments?

A_1=INT(5)
A_2=INT(10.4)
A_3=INT(−10.4)

(A) A_1=5, A_2=10, A_3=−10
(B) A_1=5, A_2=11, A_3=−10
(C) A_1=5, A_2=10, A_3=−11
(D) A_1=5, A_2=11, A_3=−11

The INT function assigns the largest integer value not greater than the original value. 5, 10, and −11 are the respective A values.

The answer is (C).

COMPUTER SCIENCE–6

What would be the value printed as a result of the following instructions?

```
10 DEF FNA(X)=X**2+1/X
20 PRINT FNA(2)
30 END
```

(A) 3.2 (B) 4.5 (C) 6.5 (D) 7.2

$$\text{FNA}(2) = (2)^2 + \frac{1}{2} = 4.5$$

The answer is (B).

COMPUTER SCIENCE–7

What would be the output of the following FORTRAN program?

```
10 DEF FNA(X,Y)=X*2+X*3–X*Y
20 READ B(1),C,D
30 DATA 3,2,4
40 PRINT FNA(B(1),B(1))
50 PRINT FNA(C/D,C*D)
60 END
```

(A) 6,–1.5 (B) 8,3 (C) 9,–11 (D) 11,–9

From the READ and DATA statements, B(1) is 3, C is 2, and D is 4. Thus, in line 40, B(1) replaces X and Y in the function statement of line 10. The output of line 40 is

$$(3)(2) + (3)(3) - (3)(3) = 6$$

Line 50 assigns $X = 2/4 = 1/2$ and $Y = (2)(4) = 8$, and then prints the function output

$$\left(\frac{1}{2}\right)(2) + \left(\frac{1}{2}\right)(3) - \left(\frac{1}{2}\right)(8) = -1.5$$

The answer is (A).

COMPUTER SCIENCE–8

If table Y represents an array, and B is 2, what is the value of Y(B+2)?

I	table Y
1	90
2	−20
3	410
4	70
5	17

(A) −22 (B) −18 (C) 17 (D) 70

When B is 2, Y(B+2)=Y(4). The value for Y(4) is 70.

The answer is (D).

COMPUTER SCIENCE–9

Why is the following expression NOT acceptable as a FORTRAN integer constant?

$$237,100$$

(A) The first character must be a letter.
(B) There are more than six characters.
(C) There is no decimal point.
(D) It contains a comma.

Commas are not allowed in integer constants.

The answer is (D).

COMPUTER SCIENCE–10

Which of the following are acceptable as FORTRAN integer variables?

I. NINA II. A+10 III. INTEGER IV. 2813 V. A160

(A) I only (B) I and V (C) I and III (D) I, III, and V

Variable names can be formed from up to six characters, the first character being a letter. Integer variables must begin with the letters I, J, K, L, M, or N; all other variable names represent real variables. The characters must be alphanumeric, hence the + character in II is not allowed. I is the only acceptable choice.

The answer is (A).

COMPUTER SCIENCE–11

Which of the following is NOT acceptable as a FORTRAN integer variable name?

(A) IRISH (B) KOST (C) MAPLE (D) INSERTS

INSERTS exceeds the limit of six characters.

The answer is (D).

COMPUTER SCIENCE–12

Which of the following are NOT acceptable as FORTRAN integer constants?

I. 5000 II. −14 III. A15 IV. 16.52 V. +999

(A) I and II (B) II and III (C) III and IV (D) II, III, IV, and V

An integer constant cannot begin with a letter character and cannot have a decimal point. Thus, III and IV are unacceptable.

The answer is (C).

COMPUTER SCIENCE–13

Which of the following are NOT acceptable as FORTRAN real constant names?

I. APPLE II. LAMB III. 4ABC IV. WATER V. TREE

(A) II and III (B) IV and V (C) I, II, and III (D) II, III, and V

LAMB is incorrect since the initial character L denotes an integer variable. 4ABC is incorrect since the first character should be a letter.

The answer is (A).

COMPUTER SCIENCE–14

What is a correct declaration form for the logical variable AZ?

(A) AZ=.TRUE. (B) AZ=1 (C) AZ=1. (D) AZ='TRUE'

For a logical variable, TRUE is enclosed in periods only.

The answer is (A).

COMPUTER SCIENCE–15

Which of the following is NOT acceptable as a FORTRAN statement?

(A) A=B (B) A=B+C (C) AB=C*D (D) A*B=C*D

The left side of an assignment statement must be a variable and not an operation. Option (D) is unacceptable.

The answer is (D).

COMPUTER SCIENCE–16

What value is assigned to A in the following expression?

$$A=3.4+(18*(4**2+17.2*8/6))-2/4$$

(A) 92.5 (B) 178.1 (C) 502.1 (D) 703.7

The expressions within parentheses are evaluated first. This is followed by exponentiation, multiplication and division, and addition and subtraction. Within each level of operation, the expressions are performed left to right.

$$A = 3.4 + \big((18)(16 + 22.93)\big) - 0.5 = 703.7$$

The answer is (D).

COMPUTER SCIENCE–17

What value would the computer assign to the FORTRAN variable D8=1.0E8−1.5E6?

(A) -0.5×10^2 (B) 1.5×10^2

(C) 9.85×10^7 (D) 10.5×10^7

The letter E denotes scientific notation. Therefore,

$$D8 = (1 \times 10^8) - (1.5 \times 10^6) = 9.85 \times 10^7$$

The answer is (C).

COMPUTER SCIENCE–18

Which of the following is a valid FORTRAN statement for the algebraic expression below?

$$\frac{3x^2 - 5x}{y^2 + 1}$$

(A) 3.0*X**2.0−5.0*X/Y**2.0+1.0

(B) (3.0X**2.0−5.0X)/Y**2.0+1.0

(C) (3.0*X**2.0−5.0*X)/(Y**2.0+1.0)

(D) (3.0*X**2.0−5.0X)/(Y**2.0+1.0)

The numerator and denominator must be enclosed in parentheses. Each operation must be explicitly and unambiguously stated. 3.0X is not a substitute for 3.0*X.

The answer is (C).

COMPUTER SCIENCE–19

Which of the following is a FORTRAN expression corresponding to the given formula?

$$\frac{\ln\left(a+\sqrt{b^3}\right)}{\sin\left(c^2+1\right)}$$

(A) ALOG10(A+SQRT(B**3.0))/SIN(C**2.0+1.0)
(B) LOG(A+SQRTB**3.0)/SIN(C**2.0+1.0)
(C) ALOG(A+SQRT(B**3.0)/SIN(C**2.0+1.0))
(D) ALOG(A+SQRT(B**3.0))/SIN(C**2.0+1.0)

The FORTRAN expression for the natural logarithm is ALOG, followed by the term enclosed in parentheses. The natural logarithm term in option (C) includes the denominator due to a misplaced parenthesis.

The answer is (D).

COMPUTER SCIENCE–20

How would the algebraic expression below be written in FORTRAN?

$$\left(1+\frac{x}{y}\right)^{x-1}$$

(A) (1.0+X/Y)*(X−1.0)
(B) (1.0+X)/Y**(X−1.0)
(C) (1.0+X/Y)**(X−1.0)
(D) (1.0+X/Y)**X−1.0

The exponent must be enclosed in parentheses in this case. Option (A) has a multiplication sign instead of an exponent sign, and the first term in option (B) is incorrect. Only option (C) is correct.

The answer is (C).

COMPUTER SCIENCE–21

How would the following expression be written in FORTRAN?

$$2 - \frac{x}{\sqrt{x^2 - \frac{1}{y}}}$$

(A) (2.0−X)/SQRT(X**2.0−1.0/Y)
(B) 2.0−(X/SQRTX**2.0−1.0/Y)
(C) 2.0−X/SQRTX**2.0−1.0/Y
(D) 2.0−X/SQRT(X**2.0−1.0/Y)

The parentheses in options (A) and (B) are wrong, and option (C) is missing parentheses around the SQRT term.

The answer is (D).

COMPUTER SCIENCE–22

Which of the following is the mathematical equivalent of the given FORTRAN expression?

SIN(2.0PI)**ABS(Y−1.0)

(A) $(\sin 2\pi)^{y-1}$ (B) $(\sin 2\pi)^{|y-1|}$
(C) $\sin 2\pi * *|y-1|$ (D) $\sin(2\pi)^{|y-1|}$

The exponent in option (A) should have absolute value signs, the (**) character in option (C) is meaningless in math, and $(\sin 2\pi)$ should be enclosed in parentheses in option (D).

The answer is (B).

COMPUTER SCIENCE–23

What is the output of the following FORTRAN program? (␣ denotes a blank space.)

```
      F=50.0*4.6
      WRITE(6,100)F
100   FORMAT(' ',T6,E9.3)
```

(A) 0.230E␣03 (B) ␣0.230E␣03

(C) ␣␣␣␣␣␣2.30E␣02 (D) ␣␣␣␣␣0.230E␣03

The T format in line 100 specifies the column location where the output starts. Thus, there are five blank spaces before the output. E9.3 means there are to be nine character positions reserved for the output, with three digits printed to the right of the decimal point in the scientific notation.

The answer is (D).

COMPUTER SCIENCE–24

Which of these FORTRAN format specifications reads the input −567610 as −5676.10?

(A) F6.2 (B) F7.2 (C) F7.3 (D) F8.2

There are a total of eight character positions used, including the negative sign and the decimal point. Since there are two digits to the right of the decimal, the correct format specification is F8.2.

The answer is (D).

COMPUTER SCIENCE–25

In a spreadsheet, the number in cell A2 is set to 2. Then cell B2 is set to A2*4/$A$2, where $ indicates the absolute cell address. This formula is copied into cells C2 and D2. The number shown in cell D2 is

(A) 2 (B) 4 (C) 8 (D) 16

The formula and value of each cell is as follows.

cell	formula	value of cell
A2	2	2
B2	A2*4/$A$2	4
C2	B2*4/$A$2	8
D2	C2*4/$A$2	16

The answer is (D).

COMPUTER SCIENCE–26

Which of the following is the corresponding FORTRAN FORMAT statement for this output? (␣ denotes a blank space.)

␣␣␣␣␣SUM=␣2230.

(A) 10 FORMAT(5X,'SUM=',F5.1)
(B) 10 FORMAT(5X,'SUM=',1X,F5.0)
(C) 10 FORMAT(5X,'SUM=',F6.1)
(D) 10 FORMAT(5X,'SUM=',1X,F5)

For the output, there are five blanks followed by text, then one blank, and finally a five-character number with no digits to the right of the decimal point. Option (B) is the correct choice.

The answer is (B).

COMPUTER SCIENCE–27

What should be the READ and FORMAT statements for this data output?

input data = 315.66

(A)
```
      READ(5,20)I
20    FORMAT(I6)
```

(B)
```
      READ(5,20)S
20    FORMAT(F6.2)
```

(C)
```
      READ(5,20)S
      FORMAT(F6.2)
```

(D)
```
      READ(5,30)S
20    FORMAT(F6.2)
```

Since the input is a real number, neither an integer variable I nor an integer field I6 can be used, thus option (A) is wrong. Option (C) is missing its FORMAT statement number, and the FORMAT statement number in option (D) does not match the READ statement number.

The answer is (B).

COMPUTER SCIENCE–28

Which of the following is the corresponding output of this WRITE statement? (␣ denotes a blank space.)

```
      KX=130
      SUM=125.3869
      WRITE(6,3)KX,SUM
3     FORMAT(I6,2X,F8.2)
```

(A) 130␣␣␣␣␣␣␣125.39
(B) ␣␣130␣125.39␣␣␣␣
(C) ␣␣␣130␣␣␣␣125.39
(D) ␣␣␣130125.39␣␣␣␣

The integer 130 will be written first, with six character positions allotted to it. There will be three blank spaces preceding the numerals, since numbers are always flush with the right side of the specified column block. After 130, two blanks are printed due to the 2X in the FORMAT statement. Finally, the real number SUM is written, with two digits to the right of the decimal and eight character positions overall. The number will be flush right in its block.

The answer is (C).

COMPUTER SCIENCE–29

Which of the following are correct WRITE and FORMAT statements for the output A=␣0.023E␣05? (␣ denotes a blank space.)

(A)
```
    WRITE(6,2)A
2   FORMAT(T2,'A=',1X,I9)
```

(B)
```
    WRITE(6,2)A
    FORMAT(T2,'A=',T4,E9.3)
```

(C)
```
    WRITE(6,2)A
2   FORMAT(T2,'A=',1X,F9.3)
```

(D)
```
    WRITE(6,2)A
2   FORMAT(T2,'A=',1X,E9.3)
```

For an output in scientific notation, the FORMAT statement cannot use an I- or F-mask as in options (A) and (C). There is no FORMAT statement number in option (B).

The answer is (D).

COMPUTER SCIENCE–30

Which of the following is the output of this WRITE statement?

```
      WRITE(6,10)
10    FORMAT(1X,'THE NUMBER=',2X,'33.15')
```

(␣ denotes a blank space.)

(A) ␣THE␣NUMBER␣=␣␣33.15
(B) ␣THE␣NUMBER=␣␣33.15
(C) ␣THE␣NUMBER=␣␣␣33.15
(D) THE␣NUMBER=␣␣␣␣33.15

There is a blank space before "THE NUMBER=," then two more blanks, and then 33.15. There is no space between the letter R and the equal sign.

The answer is (B).

COMPUTER SCIENCE–31

Numerical characters arranged as 22.2␣55184.5␣750 are available to be read. (␣ denotes a blank space.) What numbers will the computer read using the following FORMAT statement?

```
      READ(5,8) X1, X2, X3, X4
8     FORMAT(4F4.2)
```

(A) 22.2, 5.51, 8.45, 7.50
(B) 2.22, 5.51, 84.5, 7.50
(C) 22.2, 55.10, 84.5, 7.50
(D) 22.2, 5.51, 84.5, 7.50

The FORMAT statement specifies that the input is to be read four character spaces at a time from left to right, four times successively. The number read in will consist of four characters, with a maximum of two decimal places. If a decimal point was one of the initial four characters, it will be kept. Thus, the input is read as: 22.2, ␣551, 84.5, and ␣750, which become evaluated as 22.2, 5.51, 84.5, and 7.50.

The answer is (D).

COMPUTER SCIENCE–32

Which of the following is the correct WRITE statement to print the even numbers from 2 to 40, assuming conventional output device reference numbers?

(A)
```
    WRITE(6,8) (I=1,40,2)
8   FORMAT(20I2)
```

(B)
```
    WRITE(5,8) (I=2,40,2)
8   FORMAT(20I2)
```

(C)
```
    WRITE(6,8) (I=2,40,2)
8   FORMAT(20I2)
```

(D)
```
    WRITE(6,8) (I=2,40,2)
6   FORMAT(20I2)
```

The first number in the WRITE line should be 6, the conventional reference number for a printer; the WRITE line in option (B) refers to an input device instead of a printer. The second number is the FORMAT line number which is to be used; option (D) does not have the correct number in this case. Both options (A) and (C) have errors in their loop specifications: the first two numbers specify the beginning and end of the loop, and the third number specifies the increment within the loop. The correct loop specification should be (I=2,40,2) as in option (C).

The answer is (C).

COMPUTER SCIENCE–33

A data line is as follows: 21.459214.5307421557.82134524. Which of the following is an incorrect storage of this data using the following READ statement?

```
    READ(5,98)A,B,I,J,C,K
98  FORMAT(2F7.4,2I2,F6.2,I3)
```

(A) A=21.4592 (B) B=14.5307 (C) J=15 (D) K=134

The FORMAT statement specifies that the data is to be read from left to right in two blocks of seven character spaces, two blocks of two character spaces, one block of six, and one last block of three spaces. Since each block corresponds to a variable, K=345 and not 134.

The answer is (D).

COMPUTER SCIENCE–34

Which of the following is a correct IF statement?

(A) IF.(I.GE.5) GO TO 7
(B) IF (I,GE,5) GO TO 7
(C) IF (I.GE.5)
(D) IF (I.GE.5) GO TO 7

The logical IF statement has the form

IF [le] [statement]

[le] is a logical expression and [statement] is any executable statement except DO or IF. The operator within the logical expression should be of the form .[op]., and there should be no periods or commas between the components of the statement. There are no commas as in option (B).

The answer is (D).

COMPUTER SCIENCE–35

What value is assigned to Q in this program?

```
     R=18.0
     S=6.0
     T=2.0
     Q=R/S**T-T
     IF Q 10,20,30
10   Q=10
15   GO TO 40
20   Q=100
25   GO TO 40
30   Q=1000
40   END
```

(A) −1.5 (B) 10 (C) 100 (D) 1000

Before the numbered lines, Q gets the value

$$\begin{aligned} Q &= \frac{R}{S^T} - T \\ &= \frac{18}{(6)^2} - 2 \\ &= 0.5 - 2 \\ &= -1.5 \end{aligned}$$

Since Q is less than zero, the IF statement passes control of the program to line 10, where Q is reassigned the value of 10. The program then skips to the END line.

The answer is (B).

COMPUTER SCIENCE–36

Which of the following DO statements counts J from 1 to 11 in increments of 2?

(A) DO 5 J=1,2,11 (B) DO 5, J=1,11,2
(C) DO 5 J=1.11.2 (D) DO 5 J=1,11,2

The general form of the DO statement is DO s $i = j, k, l$. s is a statement number, i is the integer loop variable, j is the initial value assigned to i, k is an inclusive upper bound on i, which must exceed j, and l is the increment for i. Thus, the correct form of the statement is DO 5 J = 1, 11, 2.

The answer is (D).

COMPUTER SCIENCE–37

What is wrong with this program?

```
    DO 20 I=1,5
    A(I)=5.8
    I=5
20  CONTINUE
```

(A) A cannot be a real number.
(B) I cannot be an integer.
(C) There is an excess comma in the DO statement.
(D) The value of I cannot be changed in the DO loop.

The integer loop variable I is made a constant, creating an error in the DO loop.

The answer is (D).

COMPUTER SCIENCE–38

Which of these expressions for a one-dimensional array, A, is acceptable? Assume B, H, I, J, K, and L are greater than zero.

(A) A(I,K) (B) A(H+J) (C) A(2*L−1) (D) A(−3)

Option (C) is the only acceptable one-dimensional array. Since the array variable or element must be an integer variable or a positive integer, options (B) and (D) are wrong. Option (A) is an acceptable form for a two-dimensional array.

The answer is (C).

COMPUTER SCIENCE–39

Which is the correct DIMENSION statement for a 9×9 matrix, A, and a vector, B, with nine elements?

(A) DIMENSION A(9.9),B(9)
(B) DIM A(9,9),B(9)
(C) DIMENSION A(9,9),B(9)
(D) DIMENSION, A(9,9),B(9)

The correct choice is option (C). The DIMENSION statement does not use periods, thus option (A) is wrong. Option (B) does not have DIMENSION written completely, and option (D) has an extra comma.

The answer is (C).

COMPUTER SCIENCE–40

A 2×2 matrix, Z, is loaded from a DATA statement in the following order: 15.0, 10.0, 7.0, 20.0. List the matrix elements of Z in order of descending data magnitude.

(A) Z(1,1), Z(1,2), Z(2,1), Z(2,2)
(B) Z(2,2), Z(1,1), Z(1,2), Z(2,1)
(C) Z(1,1), Z(2,1), Z(1,2), Z(2,2)
(D) Z(2,2), Z(1,1), Z(2,1), Z(1,2)

The matrix elements are assigned in the order Z(1,1), Z(2,1), Z(1,2), and Z(2,2). These elements get the respective values of 15.0, 10.0, 7.0, and 20.0. Thus, in order of descending magnitude, the matrix elements are Z(2,2), Z(1,1), Z(2,1), Z(1,2).

The answer is (D).

COMPUTER SCIENCE–41

Find the values of X and Y after this program segment has been performed.

```
X=2
Y=4

Z=X
X=Y
Y=Z
```

(A) X=2, Y=4 (B) X=4, Y=4 (C) X=4, Y=2 (D) X=2, Y=2

The logic sequence is

Z=X=2
X=Y=4
Y=Z=2

The final X and Y values are 4 and 2, respectively.

The answer is (C).

COMPUTER SCIENCE–42

What is the value of A after this program segment is performed?

```
      A=0
      DO 77 I=1,4
77    A=A+I
```

(A) 4 (B) 5 (C) 8 (D) 10

A table of the value of A after each loop is

A	I	A=A+I
0	1	1
1	2	3
3	3	6
6	4	10

The final value of A is 10.

The answer is (D).

COMPUTER SCIENCE–43

Matt is downloading an 800 kB file from the internet using his 28.8k modem. How long will it take him to finish downloading?

(A) 0.46 min (B) 3.7 min (C) 3.8 min (D) 4.1 min

The number of bits to be transmitted is

$$\text{no. of bits transmitted} = (800 \text{ kB})\left(1024 \frac{\text{bytes}}{\text{kB}}\right)\left(8 \frac{\text{bits}}{\text{byte}}\right)$$
$$= 6.55 \times 10^6 \text{ bits}$$

The modem transmits at 28 800 bits/s. The time required for downloading is

$$t = \frac{\text{total bits to be transmitted}}{\text{transmission speed}} = \frac{6.55 \times 10^6 \text{ bits}}{\left(28\,800 \frac{\text{bits}}{\text{s}}\right)\left(60 \frac{\text{s}}{\text{min}}\right)}$$

$$= 3.8 \text{ min}$$

The answer is (C).

COMPUTER SCIENCE–44

Find the value of J after executing the following program.

```
    I=1
    J=0
15  J=J**2+I**2
    IF (I.EQ.3) GO TO 16
    I=I+1
    GO TO 15
16  CONTINUE
```

(A) 9 (B) 15 (C) 34 (D) 40

The value of J after each loop is

I	$J=J^2+I^2$
1	1
2	5
3	34

The answer is (C).

COMPUTER SCIENCE–45

Which of the following sets of statements gives a value for ISUM different than the others?

(A)
```
      ISUM=0
      DO 10 I=1,5
      ISUM=ISUM+I*2-1
10    CONTINUE
```

(B)
```
      ISUM=0
      ISIG=1
      DO 20 I=1,9
      IF (ISIG.EQ.-1) GO TO 10
      ISUM=ISUM+I
10    ISIG=-ISIG
20    CONTINUE
```

(C)
```
      ISUM=O
      DO 10 I=2,10,2
      ISUM=ISUM+I
10    CONTINUE
      ISUM=ISUM-10
```

(D)
```
      ISUM=0
      DO 10 I=1,9,2
      ISUM=ISUM+I
10    CONTINUE
```

Option (C) gives ISUM=20. All other options give ISUM=25.

The answer is (C).

COMPUTER SCIENCE–46

What is the purpose of the following program?

```
      DIMENSION KK(100)
 10   KK(I)=I
      DO 60 J=2,7
      DO 30 K=J,50
      N=J*K
 30   KK(N)=0
 60   CONTINUE
      DO 80 I=1,100
      IF (KK(I).EQ.0) GO TO 80
      WRITE(5,101) KK(I)
 101  FORMAT(3X,I5)
 80   CONTINUE
```

(A) to find a sum of the even numbers between 1 and 100
(B) to find a sum of the odd numbers between 1 and 100
(C) to find the prime numbers between 1 and 100
(D) to sort the numbers of KK(100) in descending order

This program finds the prime numbers between 1 and 100. It sets all nonprime values of the array KK equal to zero, and then writes out what remains.

The answer is (C).

COMPUTER SCIENCE–47

Given the following statements, what is the value of R in the MAIN program?

```
EXTERNAL          EXP     main program
A=0.0
R=FUNCT(A,EXP)+20.0

FUNCTION FUNCT(X,FX)      function definition
FUNCT=FX(X)
RETURN
END
```

(A) 0.0 (B) 1.0 (C) 20.0 (D) 21.0

The main program reads a value of 0 into the function FUNCT. This function is the natural exponential function e^x. Therefore, the value $e^0 = 1$ is returned to the main program, where it is summed with the value 20.0. The final value of R is 21.0.

The answer is (D).

COMPUTER SCIENCE–48

Of the following, which is the only acceptable FORTRAN statement?

(A) DIMENSION Z(TEN)
(B) WRITE(6,101) (MATRIX(J,J=1,8))
(C) READ(5,99) (TIME(X),X=1,10)
(D) READ(5,99) (TOTAL(N),N=1,20)

The only correct statement is option (D). The others are not allowed in FORTRAN.

The answer is (D).

COMPUTER SCIENCE–49

If A and B are false, and C is true, which of the following logical expressions will be true?

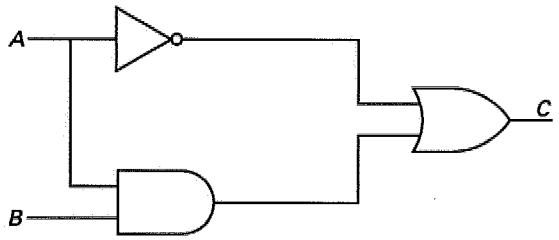
(A) .NOT.C.AND.A (B) B.AND.C.OR.A
(C) .NOT.(A.AND.B) (D) .NOT.C

Only option (C) is true. Since (A.AND.B) is false, NOT(A.AND.B) is true.

The answer is (C).

COMPUTER SCIENCE–50

A set of standard logic gates receives binary logic (values of 1 or 0) signals A and B. What is the logic representation of output signal C?



(A) $C = B$ (B) $C = 1$

(C) $C = \overline{A} + AB$ (D) $C = \overline{A}(A + B)$

The output of the NOR gate is $\overline{A}$, the output of the AND gate is AB. These two outputs go to the OR gate and the output is $\overline{A} + AB$.

The answer is (C).

COMPUTER SCIENCE–51

What are the values assigned to A and B in this subroutine?

```
COMMON ALPHA,BETA      main program
ALPHA=4.0
BETA=3.0

COMMON          B,A    subroutine
```

(A) A=3.0, B=3.0 (B) A=4.0, B=3.0

(C) A=3.0, B=4.0 (D) A=4.0, B=4.0

It is the order of the common variables that determines their value. In the subroutine, B corresponds to ALPHA=4.0 in the main program while A corresponds to BETA=3.0.

The answer is (C).

COMPUTER SCIENCE–52

Which of the following are true statements regarding user-defined functions?

I. The function is more versatile than a subroutine as it is not limited to mathematical calculations.
II. The function is defined as a variable in the main program.
III. The function may be used repeatedly and anywhere in the program

(A) I only (B) I and II (C) I and III (D) II and III

I is false, since the subroutine is more versatile. II and III are true.

The answer is (D).

COMPUTER SCIENCE–53

Which of the following would have to be added to the main program as a result of the variable XINCH being changed to INCH? Before the change, the function is

```
FUNCTION FOOT(XINCH)
FOOT=XINCH/12.0
RETURN
END
```

(A) a COMMON statement
(B) a CALL statement
(C) a DIMENSION specification
(D) a REAL variable declaration

Without a REAL variable declaration, the variable INCH would be read by the computer as an integer variable, and FOOT would have an error.

The answer is (D).

COMPUTER SCIENCE–54

What will be the output of the following program? (␣ denotes a space in the output.)

```
      REAL K
      DATA K,X/1.3,14.5
      READ(5,100) K,X
100   FORMAT(F5.1,3X,F5.1)
      F=K*X
      WRITE(6,200)K,X,F
200   FORMAT(1X,'K=',E9.2,3X,'X=',E10.3,3X,'F=',E9.2)
      STOP
999   END
```

(A) ␣K=␣0.1E␣01␣␣␣X=␣0.1E␣02␣␣␣F=␣0.2E02

(B) K=10␣␣␣X=100␣␣␣F=20

(C) ␣K=␣0.13E␣01␣␣␣X=␣0.145E␣02␣␣␣F=␣0.19E␣02

(D) ␣K=0.13E01␣␣␣X=0.145E02␣␣␣F=0.19E02

The key line in the program is line 200. Line 100 is a FORMAT line for the data read into the program, but line 200 is the FORMAT line for the output.

The answer is (C).

COMPUTER SCIENCE–55

Of the following statements, which is FALSE?

(A) The FORMAT statement may or may not be executed by the program.

(B) More than one STOP statement is permitted in a program.

(C) The arithmetic IF can only be used to evaluate an arithmetic expression.

(D) No FORMAT statement is required with unformatted READ or WRITE statements.

The FORMAT statement must be executed by the program. Therefore, option (A) is false.

The answer is (A).

COMPUTER SCIENCE–56

What is the output of the program given? (␣ denotes a space, and ⊏ denotes a blank line.)

```
      DO 30 I=1,3
      WRITE(6,10) X(I)
10    FORMAT(1X,E8.2)
      WRITE(6,20)
20    FORMAT(2X,/)
30    CONTINUE
```

(A) ␣0.41E␣04␣␣␣0.68E␣04␣␣␣0.58E␣04

(B) ␣0.41E␣04
␣0.68E␣04
␣0.58E␣04

(C) ␣0.41E␣04
⊏
␣0.68E␣04
⊏
␣0.58E␣04

(D) ␣0.41E␣04
⊏
⊏
␣0.68E␣04
⊏
⊏
␣0.58E␣04

The "/" symbol designates a skipped line. The 2X that precedes the line skip symbol in line 20 results in two skipped lines between output lines. Option (D) is the correct choice.

The answer is (D).