Sheet (1)

1. Write the following arithmetic expressions in Fortran form:

$(a)\quad x = \dfrac{a^2+b^2+a\times b}{1+\frac{a}{a+b}}$

$(c)\quad p = 8\left(\sqrt[3]{a^2} + \sqrt{a^2}\right)$

$(b)\quad V = (a-2b)^3.(3a+b)^2$

$(d)\quad z = a^{b^2} + b^{a^2}$

2. Determine the results of the following Fortran expressions:

A = 0 B = 10 C = 0.5

$(a)\quad X = A * C + (B * C) ** 2 - \log_{(10)} 10$

$(b)\quad L = B * 2 * 3/A ** 2 - 1$

$(c)\quad A = A * C * (10/B)$

$(d)\quad D = (A + B) * C/B * C$

$(e)\quad F = A + B * C/B * C$

3. State if these variables names are corrected or not, and for correct ones state the type, and for incorrect suggest a correction and type:

BE	XY800ABC
Y	A B
23A	A*A
M-N	

4. Find the value of these problems:

- 3*2+1
- 3+1*2
- 2**2-4*25+3/2
- 2.0/1
- 3/2
- 3.0/2
- 15/3*2-21/7/3+1
- 28/2**2+5
- 3.0/2.0
- 3*3-27/3

Sheet (2)

Write a program that reads three real numbers and assigns the appropriate value of true or false to the following logical variables:

TRIANG: true if three real numbers can represent lengths of the sides of a triangle, and false otherwise. (The sum of any two of the numbers must be greater than the third).

EQUIL: true TRIANG is true and the triangle is equilateral (three sides are equal).

ISOS: true TRIANG is true and the triangle is isosceles (at least two sides are equal).

SCAL: true TRIANG is true and the triangle is scalene (no two sides are equal).

The output from your program should have a format like the following:

FOR A = 2.000, B = 3.000, C = 3.000
TRIANG IS: T
EQUIL IS: F
ISOS IS: T
SCAL IS: F

Sheet (3)

1. Write a program to compute moments of inertia (I_x & I_y) of rectangular sections of width (B) and height (D).

2. Write a program to compute the area of a triangle from the lengths of its members by using the following equation :

$$A = \sqrt{P(P-A)(P-B)(P-C)}$$

Where: p = half of parameter, and A,B,C = lengths of members.

3. Write a program to calculate the maximum bending moment, maximum shear force, and maximum deflection in a simple beam subjected to uniformly distributed load (w).
Where: L = span of the beam
b.t = cross section of the beam
E = modulus of elasticity of beam material

4. If the member A,B and C of a triangle are given write a computer program to show if the angle in front of the member C is a right angle or greater than or less of 90, let the output be:
If the angle = 90 let computer write (C is a right angle).
If the angle > 90 let computer write (C is > 90).
If the angle < 90 let computer write (C is < 90).

Sheet (4)

1. Write a segment of a program to compute the following series:

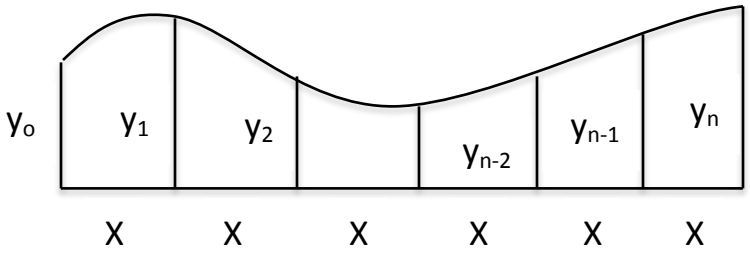
$$y = 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \cdots$$

Neglecting all terms less than 10^{-3}

2. Write a program to compute the area under the curve using Simpson's rule:

$$A = \frac{x}{3}[y_o + 2(y_2 + y_4 + \cdots + y_{n-2}) + 4(y_1 + y_3 + \cdots + y_{n-1}) + y_n]$$

Where:
n is even number
x internal distance



3. Write a program to compute the product of matrices

$$C(m * p) = A(m * n) \times B(n * p)$$

4. Write a program to compute area of plaster for any number of rooms,

Given:

(L & W) Length and width of the room/s.
(nd & nw) Number of doors and number of windows.
(Ad & Aw) Areas of doors and windows.
(h) Height of floor.

Output should take the form:

Room ID	no.	Dim.	H	nd	Ad	nw	Aw
- -	- -	- - * - -	- -	- -	- -	- -	- -

Blank line
Area of wall's plaster = - - - - m^2
Area of roof's plaster = - - - - m^2

Sheet (5)

Write a complete FORTRAN program as if you are writing it in a file in the computer to read two data and variable X and Y, then calculate the following function:

$$F(X,Y)=\begin{cases} 1+\sqrt{1+X^2}+\dfrac{X}{y} & if \quad X<5 \quad and \quad Y>0 \\ 1-\sqrt{1+X^2}+X^y & if \quad X<5 \quad and \quad y<0 \\ 5 & if \quad otherwise \end{cases}$$

Then print the value of the function.

Sheet (6)

Write a program that reads values for the coefficients A, B, C, D, E, and F of the equations: $Ax + By = c$ & $Dx + Ey = F$ of two straight lines.
Then determine whether the lines are parallel (slopes are equal) or intersect, and if they intersect, if the lines are perpendicular (product of slopes = -1)

The output should be as follows:

Lines are parallel: Yes or No
Lines are intersecting: Yes or No
Lines are perpendicular: Yes or No