S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

DEC '19

Section – 2

3. Solve the following differential equation

a) $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$

Here lagrange's subsidiary equation are:-

$$\frac{dx}{x^2 - yz} = \frac{dy}{y^3 - zx} = \frac{dz}{z^2 - xy}$$

$$\frac{dx - dy}{(x-y)(x+y+z)} = \frac{dy - dz}{(y-z)(x+y+z)} = \frac{dz - dx}{(z-x)(x+y+z)}$$

$$\frac{dx - dy}{x - y} = \frac{dy - dz}{y - z}$$

$$\log(x - y) = \log(y - z) + \log a$$

$$\log\left(\frac{x-y}{y-z}\right) = \log a \quad \text{or} \quad \frac{x-y}{y-z} = a$$

$$\frac{y-z}{z-x} = b$$

08 SUNDAY

from eq. (1.4.1) and eq. (1.4.2) the general solution is

$$\phi\left(\frac{x-y}{y-z}, \frac{y-z}{z-x}\right) = 0$$

Notes

Call

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

JAN '20

(b) Solve $y^2 \frac{z}{x} p + xzq = y^2$

Rewriting the given equation as:-

The Subsidairy equation are

$$\frac{dx}{y^2 z} = \frac{dy}{x^2 z} = \frac{dz}{y^2 x}$$

The first two fraction give $x^2 dx = y^2 dy$.
Integerating we get $x^3 - y^3 = a$
Again the first and third fraction give $x dx = z dz$
Integerating, we get $x^2 - z^2 = b$

Hence from eq (1.5.1) and eq (1.5.2) the Complete Solution is $x^3 - y^3 = f(x^2 - z^2)$.

Notes

Call