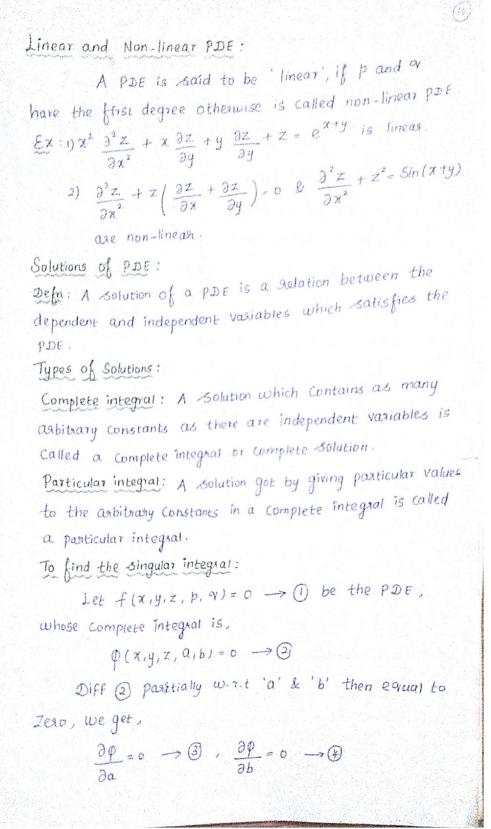


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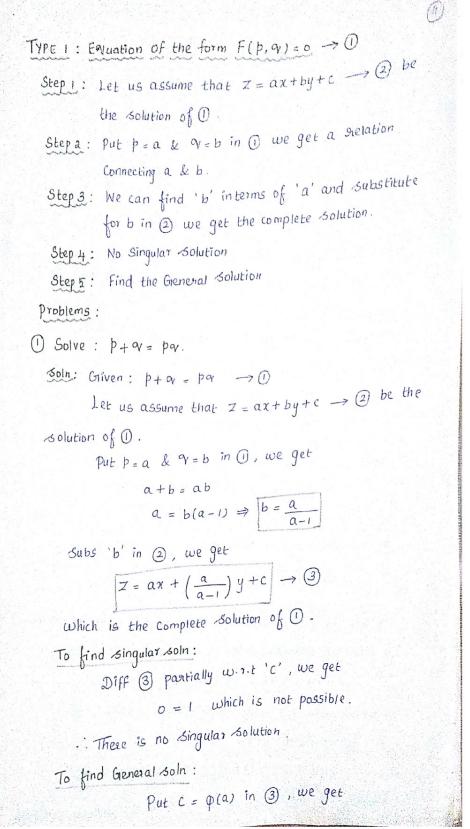
Eliminate a and b from the equations (2, 3) & (4)when it exists, is called the singular integral. To find the general integral : In the complete integral (2), we assume that b = f(a). Then (2) becomes, $p(x,y,z,a,f(a)) = 0 \rightarrow 5$ Diff 5 partially w.r.t 'a', $\frac{\partial \varphi}{\partial a} + \frac{\partial \varphi}{\partial b} f'(a) = 0 \longrightarrow \widehat{G}$ Eliminate 'a' between these two earns 3 & (7) If it exists, is called the G.I of O



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 $z = a x + \left(\frac{a}{a-1}\right) y + p(a) \longrightarrow 4$ Diff @ partially w.r.t 'a'. $0 = \chi - \frac{y}{(a-1)^2} + \varphi'(a) \longrightarrow \bigcirc$ Eliminate 'a' from (1) & (5), we get the general soln. Solve: Jp + Jav =1 Soln: Given: Jp + Jay = 1 -> 1) Let us assume that $Z = a \pi + b y + c \longrightarrow 2$ be the -solution of (). Put p=a & q=b in (1), we get $\sqrt{a} + \sqrt{b} = 1$ $\sqrt{b} = 1 - \sqrt{a}$ $b=\pm\left(1-\sqrt{a}\right)^2$ -subs 'b' in (2), we get $Z = ax \pm (1 - \sqrt{a})^2 y + c \rightarrow 3$ which is the complete solution of (1). To find the Singular -solution : Diff (3) partially w.r.t 'C', 0=1 Which is not possible ... There is no singular solution. To find the general solution: Put C= plas in 3, we get $Z = a \chi + (1 - \sqrt{a})^2 y + \varphi(a) \longrightarrow 4$ Diff (+) partially w.r.t 'a', $0 = \chi + \partial \left(1 - \sqrt{a}\right) \left(\frac{-1}{\partial \sqrt{a}}\right) y + \varphi'(a) \longrightarrow (5)$ Eliminating 'a' from (& 5 we get the general -solution.

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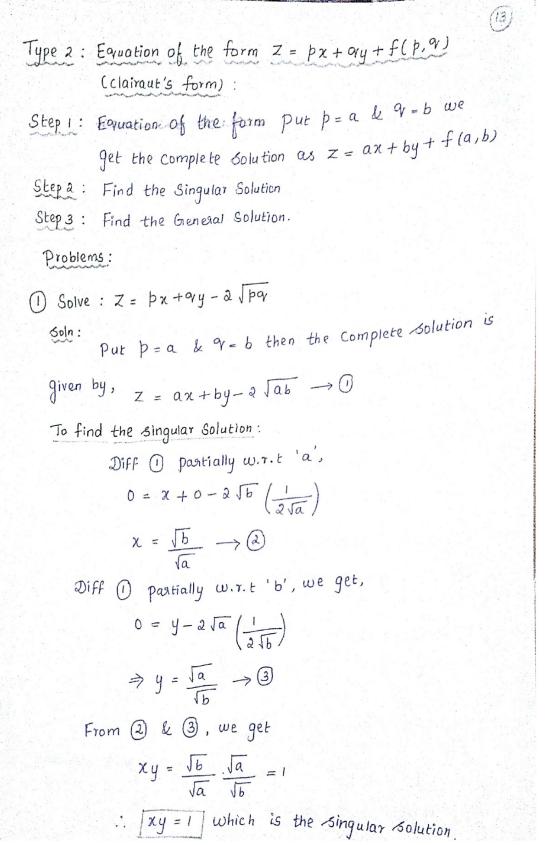


(3) Solve : p2 + q2 = 4 pq. Given : $p^2 + q^2 = 4pq \longrightarrow \mathbb{C}$ Let us assume that $z = ax + by + c \rightarrow 2$ be the Solution of (), put p = a & q = b in (), we get $a^2+b^2=4ab$ $\Rightarrow b^2 - 4ab + a^2 = 0$ =) $b = 4a \pm \sqrt{16a^2 - 4a^2} = 4a \pm \sqrt{12a^2} = 4a \pm 2a\sqrt{3}$ a = 2 $b = a(a + \sqrt{3})$ subs the value of 'b' in 2, we get $Z = ax + a(2 \pm \sqrt{3}) + c \rightarrow 3$ which is the complete solution. To find the Singular Solution : Diff 3 partially w.r.t 'c', we get 0 = which is not passible. There is no singular solution. To find the General Solution: Put c = q(a) in (3), we get $Z = ax + a(a \pm \sqrt{3}) + p(a) \rightarrow 4$ Diff (4) partially w.r.t 'a', we get. $0 = \chi + (2 \pm \sqrt{3}) + \varphi'(a) \longrightarrow (5)$ Eliminate 'a' from (4) & (5) we get the Generial Solution.



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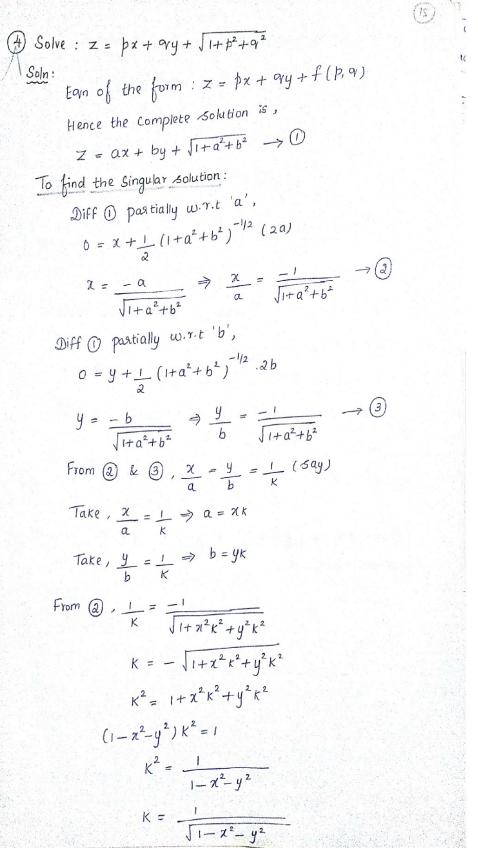


(2) Solve:
$$Z = px + qy + p^2 + q^2$$
.
Soln:
Equation of the form: $Z = px + qy + f(p, q)$
Hence the complete Solution is,
 $Z = qx + by + q^2 + b^2 \rightarrow 0$
To find the singular solution:
Diff () partially $w.r.t'a'$,
 $0 = x + qa \Rightarrow a = -\frac{x}{2} \rightarrow 2$
Diff () partially $w.r.t'b'$,
 $0 = y + 2b \Rightarrow b = -\frac{y}{2} \rightarrow 3$
Subs 'a' & 'b' in (), we get,
 $Z = -\frac{x^2}{2} - \frac{y^2}{4} + \frac{x^2}{4} + \frac{y^2}{4}$
 $Z = -\frac{x^2}{4} - \frac{y^2}{4}$
 $4Z + x^2 + y^2 = 0$ which is the singular solution



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Tupe 3: Equation of the form $F(z, p, \alpha) = p \rightarrow 0$ subs the values of a k b in 0. $Z = x^2 k^2 + y^2 k + \sqrt{1 + x^2 k^2 + y^2 k^2}$ $= x^2 k + y^2 k - k$ $= k(x^2 + y^2 - 1)$ $Z = \frac{1}{\sqrt{1 - x^2 - y^2}} (-1)(1 - x^2 - y^2)$ $Z^2 = \frac{1 - x^2 - y^2}{1 - x^2 - y^2}$ $Z^2 = 1 - x^2 - y^2$ $Z^2 + x^2 + y^2 = 1$ Which is the singular solution.