

Milne Thomson Method for constructing analytic function f(z) = u + iv

by this method f(z) is directly constructed without finding V (when u is given) or viceversa.

case Ist: - when u is given: we have f(z) = u + iv

f(z) = Dx + 1 Dx

f'(z) = du + - i du (-using c-reque)

Say $\frac{\partial u}{\partial x} = \phi_1(x,y)$, $\frac{\partial u}{\partial y} = \phi_2(x,y)$

ie f'(z) = 0, (x, y) - i 0, (x, y)

replace x by z, and y by o in \$,\$\$\phi_2\$

 $f(z) = \phi_1(z,0) - i \phi_2(z,0)$

on integrating

 $\int f'(z) dz = \int \phi_1(z,0) dz - i \int \phi_2(z,0) dz$

f(z) = (0,(z,0) dz - i (02(z,0) dz.+C

case Ind, when v is given!-

f(z) = Du + 1 DV

f(z) = 3x + i 3x

(C-R eg)

Say
$$V_{x} = \psi_{1}(x,y)$$
, $V_{y} = \psi_{2}(x,y)$

$$f'(z) = \psi_{1}(x,y) + i \psi_{2}(x,y)$$

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$$\psi_{2}(z,0) dz + i \int \psi_{2}(z,0) dz$$

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$$f'(z) = \int \psi_{1}(z,0) + i \int \psi_{2}(z,0)$$

$$\lim_{z \to z} \int \psi_{1}(z,0) + i \int \psi_{2}(z,0)$$

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$$\lim_{z \to z} \int \psi_{2}(z,$$

$$(1+i) f(z) = (1-4) + i(1+4)$$

 $F(z) = U + i Y$

$$F'(z) = U_x + iV_x$$

Now integrale.

once f(z) is Known

$$\int f(z) = \frac{F(z)}{1+i}$$



Show that ex(xcosy-ysiny) is harmonic function. Find analytic function for which ex(xcosy-ysiny) is imaginary part.

given V= ex (x cosy -y siny)

DY = ex (x cosy-ysiny) + ex cosy

Dr = ex (xcosy-ysiny) + excosy + excosy

= ex (xcosy-ysiny) + 2 excosy - 0

Dy = ex (-xsiny-ycosy-siny)

01/2 = ex (-x cosy + y siny - 2 cosy)

adding 0 8 (2)

 $\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} = 0$. $\Rightarrow v$ is harmonic function.

Non

Let f(z) = u+iv

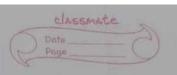
f(z) = ux + ivx

f'(z) = y + 1 /x

(x,y)= y= ex (-x sing-ycosy-siny)

Ψ, (Z,0)=

P2(xy) = Vx = ex(xcosy - ysiny) + excosy



$$\varphi_{2}(z,0) = e^{z}(z) + e^{z}$$

$$\varphi_{2}(z,0) = \psi_{1}(z,0) + i \psi_{2}(z,0)$$

$$f'(z) = 0 + i(ze^z + e^z)$$

$$f(z) = ize^{z} + C$$

required analytic function.

Q:- If
$$u = 8 \text{ in } 2x$$
 find $f(z)$.

$$\frac{1}{\cosh 2y + \cos 2x}$$

Hmt:
$$q_1(z, \omega) = 2 \cos 2z + 2$$

$$\frac{1 + \cos 2z}{2}$$

$$f(z) = 2 \int \frac{1}{1 + \cos 2z} dz + C$$