10(a) $f = u + iv$; $u = x\sin x\cosh y - y\cos x\sinh y$

& $v = x\cos x\sinh y + y\sin x\cosh y$.

C.R. eqns $u_x = v_y$ and $u_y = -v_x$

1st eqn: $u_x \equiv \cosh y\{\sin x + x\cos x\} + y\sinh y\sin x$ 1

$v_y = x\cos x\cosh y + \sin x\{\cosh y + y\sinh y\}$ 1

$u_x - v_y \equiv \cosh y\{\cancel{\sin x} + \cancel{x\cos x} - \cancel{x\cos x} - \cancel{\sin x}\}$

$+ \sinh y\{\cancel{y\sin x} - \cancel{y\sin x}\} \equiv 0$ 2

So 1st C-R eqn identically satisfied.

$u_y = x\sin x\sinh y - \cos x\{\sinh y + y\cosh y\}$ 1

$v_x = \sinh y\{\cos x - x\sin x\} + y\cosh y\cos x$ 1

2nd eqn: $u_y + v_x \equiv \sinh y\{\cancel{x\sin x} - \cancel{\cos x} + \cancel{\cos x} - \cancel{x\sin x}\}$

$+ \cosh y\{\cancel{y\cos x} - \cancel{y\cos x}\} \equiv 0$ 2

Hence C-R eqns are identically satisfied

and u, v, and all derivatives are continuous 1

everywhere. Thus f' exists everywhere 1

and therefore analytic everywhere.

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