King Fahd University of Petroleum and Minerals
MATH-302
Quiz 5

Name:- **ID:-** **Sec.:01**

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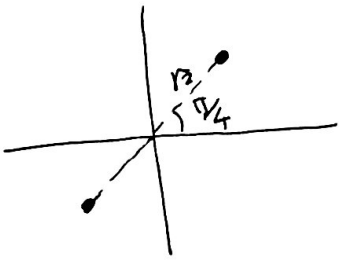
(1) Find all values of z satisfying $z^2 = 2i$.

$$z^2 = 2\left(\cos\left(\tfrac{\pi}{2}+2k\pi\right) + i\sin\left(\tfrac{\pi}{2}+2k\pi\right)\right)$$

$$z = \sqrt{2}\left(\cos\left(\tfrac{\pi}{4}+k\pi\right) + i\sin\left(\tfrac{\pi}{4}+k\pi\right)\right) \quad k = 0, 1$$



(2) If $f(z) = 2x(1-y) + iv(x,y)$ is analytic for any z, find $v(x,y)$.

C-R equations $\boxed{u_x = v_y \quad u_y = -v_x}$

$$u_x = v_y \Rightarrow 2(1-y) = \frac{\partial v}{\partial y} \qquad v = 2\left(y - \frac{y^2}{2}\right) + g(x)$$

$$u_y = -v_x \Rightarrow -2x = g'(x) \qquad g(x) = -x^2$$

$$v(x,y) = 2\left(y - \frac{y^2}{2}\right) - x^2 + c = 2y - y^2 - x^2 + c$$