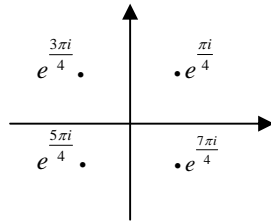


海洋大學河海工程研究所 複數 基本能力測試參考解答 2006

1. Solve $z^4 + 1 = 0$



2. Use Demovie thorem to derive $\cos(3\theta) = 4\cos^3(\theta) - 3\cos(\theta)$

$$(\cos \theta + i \sin \theta)^3 = \cos 3\theta + i \sin 3\theta$$

$$\cos 3\theta = \operatorname{Re}\{(\cos \theta + i \sin \theta)^3\}$$

$$= 4\cos^3 \theta - 3\cos \theta$$

3. Solve $x^3 + px^2 + qx + r = 0$ using the result of (2).

(1)、藉由平移 $X = x + \frac{p}{3}$ ，可化成 $X^3 + QX + R = 0$

$$\text{配合 } \cos^3 \theta - \frac{3}{4}\cos \theta = \frac{1}{4}\cos 3\theta$$

(2)、藉由 Scaling $X = sY \Rightarrow Y^3 - \frac{3}{4}Y = R_1$

H. Cardano (1501-1576).

N. Tartaglia (1499-1557).

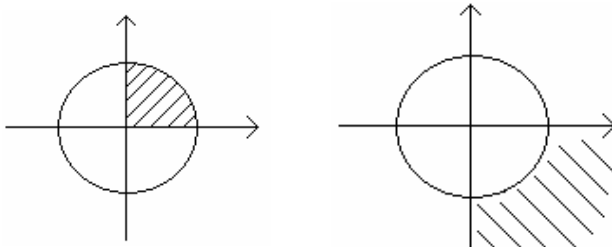
4. $\lim_{z \rightarrow 0} \frac{\operatorname{Im}(z)}{\operatorname{Re}(z)} = ?$

不存在

5. $f(z) = z$ Find $f'(z)$ at $z=(0,0)$

$$f'(z) = 1$$

6. $f(z) = 1/z$ 如何 mapping 畫畫圖 $z = x + yi, w = u + vi = 1/z$



7. 要如何將 e, π 與 -1 串起來

$$e^{\pi i} = -1$$