

$$(\cos \theta + i \sin \theta)^{\frac{2}{5}} \\ = (\cos 2\theta + i \sin 2\theta)^{\frac{1}{5}}$$

$$(\cos \theta + i \sin \theta)^{\frac{-3}{2}} \\ (\cos 3\theta - i \sin 3\theta)^{\frac{1}{2}}$$

رابطه برهنة دي موافر مع
نتیجة برهنة دي موافر

$$\left(\cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3} \right)^{\frac{1}{3}}$$

$$(\cos \theta + i \sin \theta)^{\frac{2}{3}} \\ \left[(\cos \theta + i \sin \theta)^2 \right]^{\frac{1}{3}} \\ = (\cos 2\theta + i \sin 2\theta)^{\frac{1}{3}} \\ = \cos \frac{2\theta + 2\pi k}{3} + i \sin \frac{2\theta + 2\pi k}{3}$$

برهنة دي موافر

الأس عدد صحيح ماعدا الصفر

$$Z^n = [r(\cos \theta + i \sin \theta)]^n \\ Z^n = r^n (\cos \theta + i \sin \theta)^n \\ Z^n = r^n (\cos n\theta + i \sin n\theta)$$

نتیجة برهنة دي موافر

الأس كسر $\frac{1}{n}$

$$Z^{\frac{1}{n}} = (r)^{\frac{1}{n}} (\cos \theta + i \sin \theta)^{\frac{1}{n}} \\ Z^{\frac{1}{n}} = r^{\frac{1}{n}} \left(\cos \frac{\theta + 2\pi k}{n} + i \sin \frac{\theta + 2\pi k}{n} \right)$$

ع/ جذر الجذور الستة للعدد $(-64i)$ باستخدام نتيجة مبرهنة ديموفريز $K=3 \Rightarrow Z_4 = 2(\cos \frac{5\pi}{12} + i \sin \frac{5\pi}{12}) = 2(\cos 5\frac{\pi}{4} + i \sin 5\frac{\pi}{4}) = -\sqrt{2} - \sqrt{2}i$

$$K=4 \Rightarrow Z_5 = 2(\cos \frac{19\pi}{12} + i \sin \frac{19\pi}{12})$$

$$K=5 \Rightarrow Z_6 = 2(\cos \frac{23\pi}{12} + i \sin \frac{23\pi}{12})$$

$$Z = 64(-i)$$

$$Z = 64(\cos 3\frac{\pi}{2} + i \sin 3\frac{\pi}{2})$$

بالجذر السادس

$$Z = \sqrt[6]{64} (\cos 3\frac{\pi}{2} + i \sin 3\frac{\pi}{2})^{\frac{1}{6}}$$

$$Z = 2(\cos \frac{3\frac{\pi}{2} + 2\pi K}{6} + i \sin \frac{3\frac{\pi}{2} + 2\pi K}{6}) \quad K=0,1,2,3,4,5$$

$$K=0 \Rightarrow Z_1 = 2(\cos \frac{3\pi}{4} + i \sin \frac{3\pi}{4}) = 2(\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}i) = \sqrt{2} + \sqrt{2}i$$

$$K=1 \Rightarrow Z_2 = 2(\cos \frac{7\pi}{12} + i \sin \frac{7\pi}{12})$$

$$K=2 \Rightarrow Z_3 = 2(\cos \frac{11\pi}{12} + i \sin \frac{11\pi}{12})$$

وزاري
2014
عدد الأول

جد الصيغة القطبية للجذور الخمسة للعدد المركب $(1+i)^{\frac{1}{5}}$
أو باستخدام نتيجة مبرهنة دي موافر $(1+i)^{\frac{1}{5}}$

$$k=0 \Rightarrow Z_1 = \sqrt[5]{2} \left(\cos \frac{\pi}{10} + i \sin \frac{\pi}{10} \right) \quad Z = 1+i \Rightarrow (1,1)$$

$$k=1 \Rightarrow Z_2 = \sqrt[5]{2} \left(\cos \frac{5\pi}{10} + i \sin \frac{5\pi}{10} \right) \quad r = \sqrt{x^2 + y^2} = \sqrt{2}$$

$$Z_2 = \sqrt[5]{2} (0+i) \quad \cos 0 = \frac{x}{r} = \frac{1}{\sqrt{2}} \quad \theta = \frac{\pi}{4} \text{ اول}$$

$$k=2 \Rightarrow Z_3 = \sqrt[5]{2} \left(\cos \frac{7\pi}{10} + i \sin \frac{7\pi}{10} \right) \quad \sin 0 = \frac{y}{r} = \frac{1}{\sqrt{2}} \quad \arg(z) = \left(\frac{\pi}{4} \right)$$

$$Z_3 = \sqrt[5]{2} \left(\cos \frac{7\pi}{5} + i \sin \frac{7\pi}{5} \right)$$

$$k=3 \Rightarrow Z_4 = \sqrt[5]{2} \left(\cos \frac{9\pi}{10} + i \sin \frac{9\pi}{10} \right) \quad Z = (\sqrt[5]{2}) \left(\cos \frac{\pi}{4} + i \sin \frac{\pi}{4} \right)$$

$$Z_4 = \sqrt[5]{2} \left(\cos \frac{9\pi}{5} + i \sin \frac{9\pi}{5} \right)$$

$$k=4 \Rightarrow Z_5 = \sqrt[5]{2} \left(\cos \frac{11\pi}{10} + i \sin \frac{11\pi}{10} \right) \quad Z = (2) \left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2} \right)$$

$$Z_5 = \sqrt[5]{2} \left(\cos \frac{11\pi}{5} + i \sin \frac{11\pi}{5} \right)$$

$$Z = \sqrt[5]{2} \left(\cos \frac{\pi + 2\pi k}{5} + i \sin \frac{\pi + 2\pi k}{5} \right)$$

$$Z_5 = \sqrt[5]{2} \left(\cos \frac{11\pi}{5} + i \sin \frac{11\pi}{5} \right)$$

$$k=0,1,2,3,4$$

وزاري
2014
عدد الأول

جد الصيغة القطبية للجذور الخمسة للعدد المركب $(\sqrt{3}+i)^{\frac{2}{5}}$
أو باستخدام نتيجة مبرهنة دي موافر $(\sqrt{3}+i)^{\frac{2}{5}}$

$$k=0 \Rightarrow Z_1 = \sqrt[5]{4} \left(\cos \frac{\pi}{15} + i \sin \frac{\pi}{15} \right) \quad Z = \sqrt{3}+i \Rightarrow (\sqrt{3},1)$$

$$k=1 \Rightarrow Z_2 = \sqrt[5]{4} \left(\cos \frac{7\pi}{15} + i \sin \frac{7\pi}{15} \right) \quad r = \sqrt{x^2 + y^2} = \sqrt{3+1} = \sqrt{4} = 2$$

$$Z_2 = \sqrt[5]{4} \left(\cos \frac{7\pi}{5} + i \sin \frac{7\pi}{5} \right) \quad \cos 0 = \frac{x}{r} = \frac{\sqrt{3}}{2} \quad \theta = \frac{\pi}{6} \text{ اول}$$

$$k=2 \Rightarrow Z_3 = \sqrt[5]{4} \left(\cos \frac{13\pi}{15} + i \sin \frac{13\pi}{15} \right) \quad \sin 0 = \frac{y}{r} = \frac{1}{2} \quad \arg(z) = \left(\frac{\pi}{6} \right)$$

$$Z_3 = \sqrt[5]{4} \left(\cos \frac{13\pi}{5} + i \sin \frac{13\pi}{5} \right)$$

$$k=3 \Rightarrow Z_4 = \sqrt[5]{4} \left(\cos \frac{19\pi}{15} + i \sin \frac{19\pi}{15} \right) \quad Z = (2) \left(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6} \right)$$

$$Z_4 = \sqrt[5]{4} \left(\cos \frac{19\pi}{5} + i \sin \frac{19\pi}{5} \right)$$

$$k=4 \Rightarrow Z_5 = \sqrt[5]{4} \left(\cos \frac{25\pi}{15} + i \sin \frac{25\pi}{15} \right) \quad Z = (4) \left(\cos \frac{\pi}{3} + i \sin \frac{\pi}{3} \right)$$

$$Z_5 = \sqrt[5]{4} \left(\cos \frac{25\pi}{5} + i \sin \frac{25\pi}{5} \right)$$

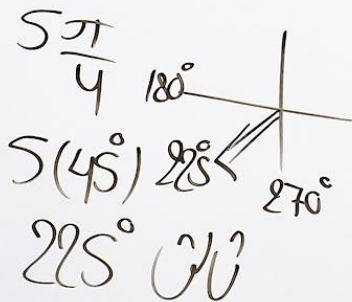
$$Z = \sqrt[5]{4} \left(\cos \frac{\pi + 2\pi k}{5} + i \sin \frac{\pi + 2\pi k}{5} \right)$$

$$Z_5 = \sqrt[5]{4} \left(\cos \frac{25\pi}{5} + i \sin \frac{25\pi}{5} \right)$$

$$Z_5 = \sqrt[5]{4} \left(\frac{1}{2} - \frac{\sqrt{3}}{2}i \right)$$

$$k=0,1,2,3,4$$

$$\frac{\frac{\frac{\pi}{2} + 9\pi}{2}}{2} = \frac{5\pi}{2}$$



$$Z^{-\frac{3}{2}} = \frac{1}{\sqrt{8}} \left(\cos \frac{\frac{\pi}{2} + 2\pi k}{2} - i \sin \frac{\frac{\pi}{2} + 2\pi k}{2} \right)$$

$$k=0,1$$

$$k=0$$

$$Z_1 = \frac{1}{\sqrt{8}} \left(\cos \frac{\pi}{4} - i \sin \frac{\pi}{4} \right)$$

$$Z_1 = \frac{1}{\sqrt{8}} \left(\frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}} i \right) = \frac{1}{\sqrt{16}} - \frac{1}{\sqrt{16}} i$$

$$= \frac{1}{4} - \frac{1}{4} i$$

$$k=1$$

$$Z_2 = \frac{1}{\sqrt{8}} \left(\cos \frac{5\pi}{4} - i \sin \frac{5\pi}{4} \right)$$

$$Z_2 = \frac{1}{\sqrt{8}} \left(-\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} i \right) = -\frac{1}{\sqrt{16}} + \frac{1}{\sqrt{16}} i = -\frac{1}{4} + \frac{1}{4} i$$

وزاري 2017 الدور الأول 2024/2024

بأنستخدم شجرة برهنة وعواقب
أحسب $(\sqrt{3} + i)^{\frac{3}{2}}$

$$Z = \sqrt{3} + i \Rightarrow (\sqrt{3}, 1)$$

$$r = \sqrt{x^2 + y^2} = \sqrt{3+1} = \sqrt{4} = 2$$

$$\cos \theta = \frac{x}{r} = \frac{\sqrt{3}}{2} \quad \theta = \frac{\pi}{6}$$

$$\sin \theta = \frac{y}{r} = \frac{1}{2}$$

$$\arg(Z) = \frac{\pi}{6}$$

$$Z = (2)^{-3} \left(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6} \right)$$

$$Z = \frac{1}{8} \left(\cos \frac{\pi}{2} - i \sin \frac{\pi}{2} \right)$$

بالجذر $\frac{1}{2}$ الشبكي