

Homework #59

Answers

From Houghton-Mifflin Precalculus

3rd Edition

p476:

92) Square roots of: $16(\cos 60^\circ + i \sin 60^\circ)$

$$\text{Use: } \frac{60^\circ + 360^\circ(0)}{2} = 30^\circ \quad \text{and} \quad \frac{60^\circ + 360^\circ(1)}{2} = 210^\circ$$

$$4(\cos 30^\circ + i \sin 30^\circ) = 4(\frac{\sqrt{3}}{2} + i \frac{1}{2}) = 2\sqrt{3} + 2i$$

$$4(\cos 210^\circ + i \sin 210^\circ) = 4(-\frac{\sqrt{3}}{2} + i(-\frac{1}{2})) = -2\sqrt{3} - 2i$$

93) Fourth roots of: $16(\cos (4\pi/3) + i \sin (4\pi/3))$

$$\text{Use: } \frac{240^\circ + 360^\circ(0)}{4} = 60^\circ, \quad \frac{240^\circ + 360^\circ(1)}{4} = 150^\circ,$$

$$\frac{240^\circ + 360^\circ(2)}{4} = 240^\circ, \quad \frac{240^\circ + 360^\circ(3)}{4} = 330^\circ$$

$$2(\cos 60^\circ + i \sin 60^\circ) = 2(\frac{1}{2} + i \frac{\sqrt{3}}{2}) = 1 + i\sqrt{3}$$

$$2(\cos 150^\circ + i \sin 150^\circ) = 2(-\frac{\sqrt{3}}{2} + i \frac{1}{2}) = -\sqrt{3} + i$$

$$2(\cos 240^\circ + i \sin 240^\circ) = 2(-\frac{1}{2} + i(-\frac{\sqrt{3}}{2})) = -1 - i\sqrt{3}$$

$$2(\cos 330^\circ + i \sin 330^\circ) = 2(\frac{\sqrt{3}}{2} + i(-\frac{1}{2})) = \sqrt{3} - i$$

94) Fifth roots of $32(\cos (5\pi/6) + i \sin (5\pi/6))$

$$\text{Use: } \frac{150^\circ + 360^\circ(0)}{5} = 30^\circ, \quad \frac{150^\circ + 360^\circ(1)}{5} = 102^\circ, \quad \frac{150^\circ + 360^\circ(2)}{5} = 174^\circ,$$

$$\frac{150^\circ + 360^\circ(3)}{5} = 246^\circ, \quad \frac{150^\circ + 360^\circ(4)}{5} = 318^\circ$$

$$2(\cos 30^\circ + i \sin 30^\circ) = 2(\frac{\sqrt{3}}{2} + i \frac{1}{2}) = \sqrt{3} + i = 1.732 + i$$

$$2(\cos 102^\circ + i \sin 102^\circ) = 2(-.208 + i .978) = -.416 + 1.956i$$

$$2(\cos 174^\circ + i \sin 174^\circ) = 2(-.995 + i .105) = -1.989 + .209i$$

$$2(\cos 246^\circ + i \sin 246^\circ) = 2(-.407 + i(-.914)) = -.813 - 1.827i$$

$$2(\cos 318^\circ + i \sin 318^\circ) = 2(.743 + i(-.669)) = 1.486 - 1.338i$$

97) Cube roots of: $(-125/2)(1 + \sqrt{3}i)$ $r = \sqrt{1 + 3} = 2$ $\tan \theta = \sqrt{3}/1$; $\theta = 60^\circ$ Cube roots of: $(-125/2)(2)(\cos 60^\circ + i \sin 60^\circ)$

$$\text{Use: } \frac{60^\circ + 360^\circ(0)}{3} = 20^\circ, \quad \frac{60^\circ + 360^\circ(1)}{3} = 140^\circ, \quad \frac{60^\circ + 360^\circ(2)}{3} = 260^\circ$$

$$-5(\cos 20^\circ + i \sin 20^\circ) = -5(.9397 + i .342i) = -4.69 - 1.71i$$

$$-5(\cos 140^\circ + i \sin 140^\circ) = -5(-.766 + i .6428i) = -3.83 + 3.21i$$

$$-5(\cos 260^\circ + i \sin 260^\circ) = -5(-.1736 - i .9848i) = .87 + 4.92i$$