**9.** Use de Moivre's theorem to solve,

(i) $z^2 = 1 + \sqrt{3}i$ (ii) $z^2 = 2 - 2\sqrt{3}i$ (iii) $z^2 = 4i$.

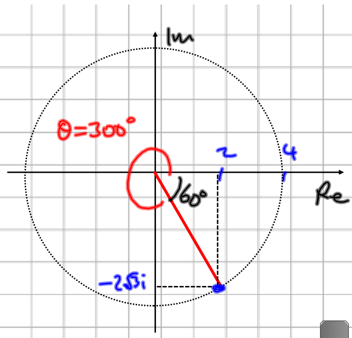
① $z^2 = w \Rightarrow z = w^{1/2}$
write $w$ in $r\,\mathrm{Cis}\,\theta$ form

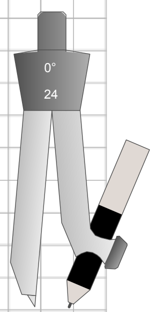
② Work out arguments
$\theta_0 =$
$\theta_1 = \quad +360 =$

③ apply deMoivre's theorem
$(r\,\mathrm{Cis}\,\theta)^n = r^n\,\mathrm{Cis}\,n\theta$
to 2 versions of polar complex number

④ evaluate with Calculator

$r = \sqrt{2^2 + (2\sqrt{3})^2}$
$= \sqrt{4+12} = 4$



$w_1 = 4\,\mathrm{Cis}\,300°$
$w_2 = 4\,\mathrm{Cis}\,660°$

$z_1 = (4\,\mathrm{Cis}\,300°)^{1/2} = 2\,\mathrm{Cis}\,150°$
$= 2\left(-\frac{\sqrt{3}}{2} + \frac{1}{2}i\right) = -\sqrt{3} + i$

$z_2 = (4\,\mathrm{Cis}\,660°)^{\frac{1}{2}} = 2\,\mathrm{Cis}\,330°$
$= 2\left(\frac{\sqrt{3}}{2} - \frac{1}{2}i\right) = \sqrt{3} - i$

**9.** Use de Moivre's theorem to solve,

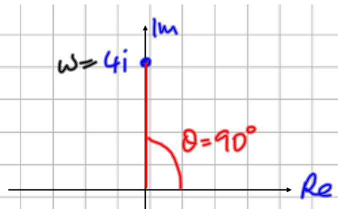
(i) $z^2 = 1 + \sqrt{3}i$ (ii) $z^2 = 2 - 2\sqrt{3}i$ (iii) $z^2 = 4i$.

① $z^2 = w \Rightarrow z = w^{1/2}$
write $w$ in $r\,\mathrm{Cis}\,\theta$ form

② Work out arguments
$\theta_0 = 90°$
$\theta_1 = 90° + 360 = 450°$

③ apply deMoivre's theorem
$(r\,\mathrm{Cis}\,\theta)^n = r^n\,\mathrm{Cis}\,n\theta$
to 2 versions of polar complex number

④ evaluate with Calculator




$r = |4i| = 4$

$w_1 = 4\,\mathrm{Cis}\,90°$
$w_2 = 4\,\mathrm{Cis}\,450°$

$z_1 = (4\,\mathrm{Cis}\,90°)^{1/2} = 2\,\mathrm{Cis}\,45°$
$= 2\left(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i\right) = \sqrt{2} + \sqrt{2}i$

$z_2 = (4\,\mathrm{Cis}\,450°)^{\frac{1}{2}} = 2\,\mathrm{Cis}\,225°$
$= 2\left(-\frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2}i\right) = -\sqrt{2} - \sqrt{2}i$