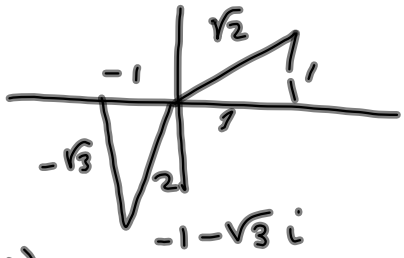
Find the product or quotient in
(a) standard form, by ordinary means
(b) converting to polar form




1+i

(a)

(1) $(1+i)(-1-\sqrt{3}\,i)$

$= -1 - \sqrt{3}\,i - i - \sqrt{3}\,i^2$

$= -1 - \sqrt{3}\,i - i + \sqrt{3}$

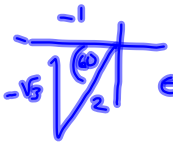
$= (-1+\sqrt{3}) + (-1-\sqrt{3})\,i \approx .73 - 2.73i$

$(240)\left(\frac{\pi}{180}\right) = \frac{4\pi}{3}$

(b)


$(1,i) = 1+i$

$\theta = \frac{\pi}{4}$




$\theta = \frac{4\pi}{3}$

$z_1 = \sqrt{2}\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$

$= \sqrt{2}\left(\frac{1}{\sqrt{2}} + i\cdot\frac{1}{\sqrt{2}}\right) = 1+i$

$z_2 = 2\left(\cos\frac{4\pi}{3} + i\sin\frac{4\pi}{3}\right)$

$= 2\left(-\frac{1}{2} + i\cdot\frac{-\sqrt{3}}{2}\right)$

$= -1 - \sqrt{3}\,i$

$z_1 z_2 = 2\sqrt{2}\left(\cos\frac{19\pi}{12} + i\sin\frac{19\pi}{12}\right)$

$2\sqrt{2}\,(.25882 - .9659i)$

$\approx .73 - 2.73i$ Sweet!

$\frac{4\pi}{3} + \frac{\pi}{4}$

$= \frac{16\pi + 3\pi}{12} = \frac{19\pi}{12}$

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      .7320508076
-1-√(3)
     -2.732050808
cos(19π/12)
      .2588190451
sin(19π/12)
     -.9659258263
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(2) $\dfrac{1+i}{-1-\sqrt{3}\,i} = \left(\dfrac{1+i}{-1-\sqrt{3}\,i}\right)\left(\dfrac{-1+\sqrt{3}\,i}{-1+\sqrt{3}\,i}\right)$

(a) $= \dfrac{-1+\sqrt{3}\,i-i+\sqrt{3}\,i^2}{1+3} = \dfrac{-1-\sqrt{3}+(-1+\sqrt{3})\,i}{4}$

$= \dfrac{-1-\sqrt{3}}{4} + \dfrac{(-1+\sqrt{3})}{4}\,i$

$\approx -.68 + .18\,i$

$\dfrac{\pi}{4} - \dfrac{4\pi}{3}$

$\dfrac{3\pi-16\pi}{12} = -\dfrac{13\pi}{12}$

(b) $\dfrac{\sqrt{2}\left(\cos\frac{\pi}{4}+i\sin\frac{\pi}{4}\right)}{2\left(\cos\frac{4\pi}{3}+i\sin\frac{4\pi}{3}\right)} = \dfrac{\sqrt{2}}{2}\left(\cos-\dfrac{13\pi}{12}+i\sin\left(-\dfrac{13\pi}{12}\right)\right)$