Divide by $x-(1+2i)$

| | | | | |
|---|---|---|---|---|
| $1+2i$ | $3$ | $-8$ | $19$ | $-10$ |
| | | $3+6i$ | $-17-4i$ | $10$ |
| $1-2i$ | $3$ | $-5+6i$ | $2-4i$ | $0$ |
| | | $3-6i$ | $-2+4i$ | |
| | $3$ | $-2$ | $0$ | |

This says $f(x)=(x-(1+2i))(x-(1-2i))(3x-2) \rightarrow 3(x-\frac{2}{3})$

$q=3 \ldots \quad -10=p$

$\pm1, \pm2, \pm5, \pm10$

$\pm\frac{1}{3}, \pm\frac{2}{3}, \pm\frac{5}{3}, \pm\frac{10}{3}$

| | | | | |
|---|---|---|---|---|
| $1$ | $3$ | $-8$ | $19$ | $-10$ |
| | | $3$ | $-5$ | $14$ |
| | $3$ | $-5$ | $14$ | $4\neq0$ |

| | | | | |
|---|---|---|---|---|
| $\frac{2}{3}$ | $3$ | $-8$ | $19$ | $-10$ |
| | | $2$ | $-4$ | $10$ |
| | $3$ | $-6$ | $15$ | $0$ |
| | $x^2$ | $x'$ | $c$ | $r$ |

$(x-\frac{2}{3})(\underline{3x^2-6x+15})$

Depressed polynomial

$3x^3-8x^2+19x-10=f(x)$

$3x^2-6x+15=0$

$x^2-2x+5=0$

$x^2-2x+\left(\frac{2}{2}\right)^2+5-1=0$

$(x-1)^2+4=0$

$(x-1)^2=-4$

$\sqrt{(x-1)^2}=\sqrt{-4}$

$|x-1|=2i$

$x-1=\pm2i$

$x=1\pm2i$

$= f(x)= 3(x-\frac{2}{3})(x-(1+2i))(x-(1-2i))$

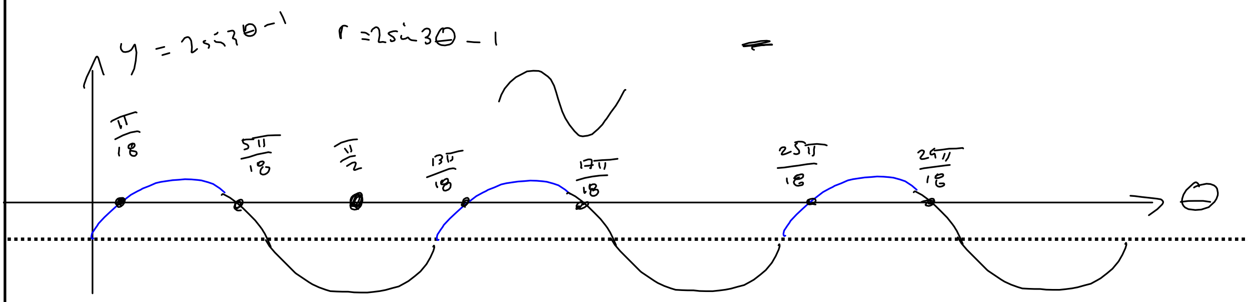
$=(3x-2)(\cdot\cdot\cdot\cdot \quad )$

$(1+2i)(2-4i)=2(1+2i)(1-2i)=2[1^2+2^2]=2[5]=10$

$(1+2i)(-5+6i)=-5+6i-10i+12i^2$

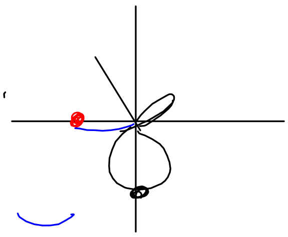
$=-5-4i-12=-17-4i$

$r = 2\sin 3\theta - 1$




solve $2\sin 3\theta - 1 = 0$ find all $\theta \in [0, 2\pi)$

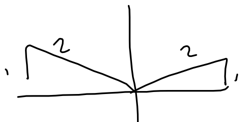
We need to find all $3\theta \in [0, 6\pi)$ that solve it.



$2\sin 3\theta = 1$

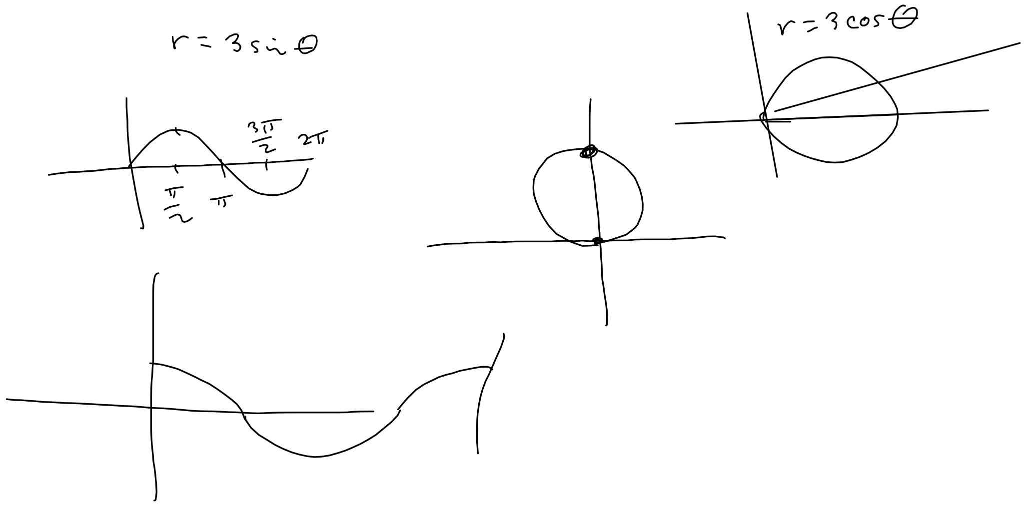
$\sin 3\theta = \frac{1}{2}$ $\qquad \frac{5\pi}{6} + \frac{12\pi}{6} = \frac{17\pi}{6}$

$\frac{\pi}{6} + 2\pi = \frac{\pi}{6} + \frac{12\pi}{6} = \frac{13\pi}{6}$




$3\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{13\pi}{6}, \frac{17\pi}{6}, \frac{25\pi}{6}, \frac{29\pi}{6}$

$\Rightarrow \theta = \frac{\pi}{18}, \frac{5\pi}{18}, \ldots \frac{25\pi}{18}, \frac{29\pi}{18}$ $\qquad \frac{29\pi + 12\pi}{6} = \frac{41\pi}{6}$


$r = 3\sin\theta$
$\frac{\pi}{2}$
$\pi$
$\frac{3\pi}{2}$
$2\pi$
$r = 3\cos\theta$