Polar Systems of Equations WS (Intersections)

1) $(\sqrt{3}, \frac{\pi}{6}), (\sqrt{3}, \frac{11\pi}{6})$

2) $(\frac{1}{2}, \frac{\pi}{6}), (\frac{1}{2}, \frac{5\pi}{6}), (0,0)$

3) $(\sqrt{3}, \frac{\pi}{3})$ $(0,0)$
or
$(-\sqrt{3}, \frac{4\pi}{3})$

4) $(1, \frac{\pi}{6})$ $(1, \frac{5\pi}{6})$, $(-2, \frac{3\pi}{2})$, $(0,0)$
or
$(2, \frac{\pi}{2})$

5) $(\sqrt{3}, \frac{\pi}{3}), (-\sqrt{3}, \frac{5\pi}{3})$ $(0,0)$
or
$(\sqrt{3}, \frac{2\pi}{3})$

6) $(2, \frac{\pi}{3}), (2, \frac{5\pi}{3})$

7) $(1, \frac{\pi}{6}), (1, \frac{7\pi}{6}), (1, \frac{5\pi}{6}), (1, \frac{11\pi}{6})$
$(1, \frac{\pi}{3}), (1, \frac{2\pi}{3}), (1, \frac{4\pi}{3}), (1, \frac{5\pi}{3})$

#8-11 Part of the Polar Project

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1) $r=\sqrt{3}$

$r=2\cos\theta$

$2\cos\theta=\sqrt{3}$

$\cos\theta=\frac{\sqrt{3}}{2}$

$\theta=\frac{\pi}{6},\frac{11\pi}{6}$

$\left(\sqrt{3},\frac{\pi}{6}\right),\left(\sqrt{3},\frac{11\pi}{6}\right)$

2) $r=\sin\theta$

$r=1-\sin\theta$

$\sin\theta=1-\sin\theta$

$2\sin\theta=1$

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

$\theta=\frac{\pi}{6},\frac{5\pi}{6}$

$r=\frac{1}{2}$

$\left(\frac{1}{2},\frac{\pi}{6}\right),\left(\frac{1}{2},\frac{5\pi}{6}\right),(0,0)$

3) $2\sin\theta=2\sqrt{3}\cos\theta$

$\sin\theta=\sqrt{3}\cos\theta$

$\tan\theta=\sqrt{3}$

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

$r=2\sin\left(\frac{\pi}{3}\right)$

$r=2\left(\frac{\sqrt{3}}{2}\right)$

$r=\sqrt{3}$

$r=2\sin\left(\frac{4\pi}{3}\right)$

$r=2\left(-\frac{\sqrt{3}}{2}\right)$

$r=-\sqrt{3}$

$\left(\sqrt{3},\frac{\pi}{3}\right)$

$\left(-\sqrt{3},\frac{4\pi}{3}\right)$ same point

$(0,0)$

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4) $2\sin\theta = 2\cos 2\theta$

$\sin\theta = \cos 2\theta$

$\sin\theta = (1 - 2\sin^2\theta)$

$2\sin^2\theta + \sin\theta - 1 = 0$

$(2\sin\theta - 1)(\sin\theta + 1) = 0$

$\sin\theta = \frac{1}{2}$ $\quad$ $\sin\theta = -1$

$\theta = \frac{\pi}{6}, \frac{5\pi}{6}$ $\quad$ $\theta = \frac{3\pi}{2}$

$r = 1$ $\quad$ $r = -2$

$(1, \frac{\pi}{6}), (1, \frac{5\pi}{6}),$
$(-2, \frac{3\pi}{2})$, $(0,0)$
or
$(2, \frac{\pi}{2})$

5) $2\sin\theta = 2\sin 2\theta$

$\sin\theta = 2\sin\theta\cos\theta$

$\sin\theta - 2\sin\theta\cos\theta = 0$

$\sin\theta(1 - 2\cos\theta) = 0$

$\sin\theta = 0$ $\quad$ $2\cos\theta = 1$

$\theta = 0, \pi$ $\quad$ $\cos\theta = \frac{1}{2}$

$(0,0)$ $\quad$ $\theta = \frac{\pi}{3}, \frac{5\pi}{3}$

or $\quad$ $\sqrt{3}, -\sqrt{3}$

$(0, \pi)$

$(0,0)$
$(\sqrt{3}, \frac{\pi}{3})$
$(-\sqrt{3}, \frac{5\pi}{3})$
or
$(\sqrt{3}, \frac{2\pi}{3})$.

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6) $r = 2$

$r = \sec\theta$

$2 = \frac{1}{\cos\theta}$ $\quad (2, \frac{\pi}{3})$

$\cos\theta = \frac{1}{2}$ $\quad (2, \frac{5\pi}{3})$

$\theta = \frac{\pi}{3}, \frac{5\pi}{3}$

$r = 2$

7) $r = 1$

$r = 2\cos 2\theta$

$2\cos 2\theta = 1$

$\cos 2\theta = \frac{1}{2}$

$2\theta = \frac{\pi}{3} + 2k\pi \quad \theta = \frac{\pi}{6} + k\pi$

$2\theta = \frac{5\pi}{3} + 2k\pi \quad \theta = \frac{5\pi}{6} + k\pi$

$(1, \frac{\pi}{6}), (1, \frac{7\pi}{6}), (1, \frac{5\pi}{6}), (1, \frac{11\pi}{6})$

Not solutions but on graph $(1, \frac{\pi}{3}), (1, \frac{2\pi}{3}), (1, \frac{4\pi}{3}), (1, \frac{5\pi}{3})$

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