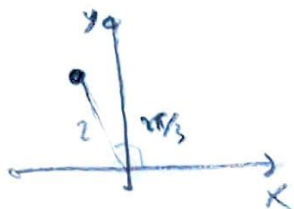


250 F20 solutions to WS-13 Polar time

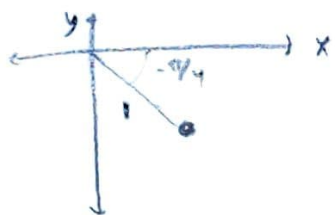
1. a) $(2, \frac{2\pi}{3}) \rightsquigarrow (-1, \sqrt{3})$



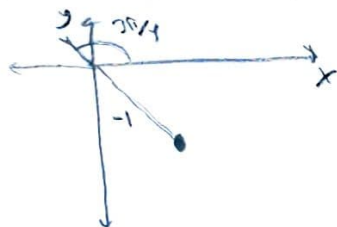
$$x = 2 \cos \frac{2\pi}{3} = -1$$

$$y = 2 \sin \frac{2\pi}{3} = \sqrt{3}$$

b) $(1, -\frac{\pi}{4}) \rightsquigarrow (\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$



c) $(-1, \frac{3\pi}{4}) \rightsquigarrow (\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$



2. a) $(\sqrt{3}, 1) \rightsquigarrow (2, \frac{\pi}{6})$ or $(-2, \frac{7\pi}{6})$ or $(2, \frac{13\pi}{6})$ or ...

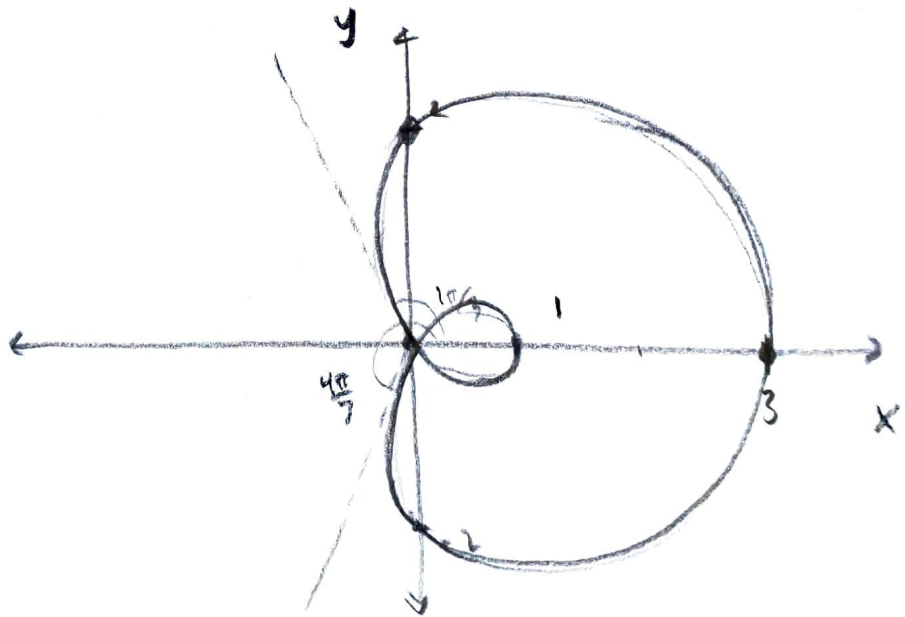
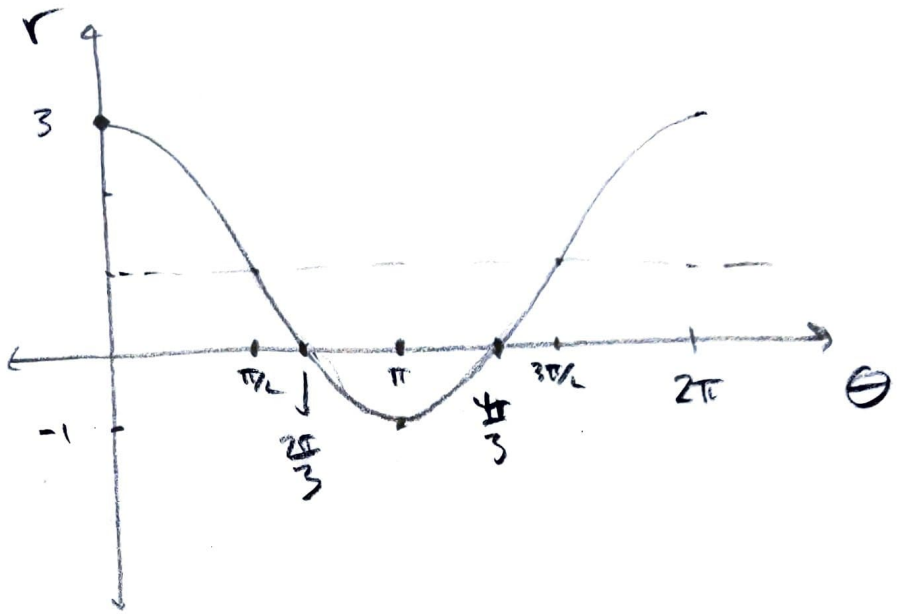
b) $(-1, 1) \rightsquigarrow (\sqrt{2}, \frac{3\pi}{4})$ or $(-\sqrt{2}, -\frac{\pi}{4})$ or $(\sqrt{2}, -\frac{5\pi}{4})$ or ...

c) $(2, -\sqrt{2}) \rightsquigarrow (4, -\frac{\pi}{3})$ or $(-4, \frac{2\pi}{3})$ or $(4, \frac{5\pi}{3})$ or ...

$$\tan \theta = -\frac{\sqrt{2}}{2} = -\sqrt{3}$$

3. $r = 1 + 2\cos\theta$

θ	$r = 1 + 2\cos\theta$
0	3
$\frac{\pi}{6}$	$1 + \sqrt{3}$
$\frac{\pi}{4}$	$1 + \sqrt{2}$
$\frac{\pi}{3}$	2
$\frac{\pi}{2}$	1
$\frac{2\pi}{3}$	0
...	...

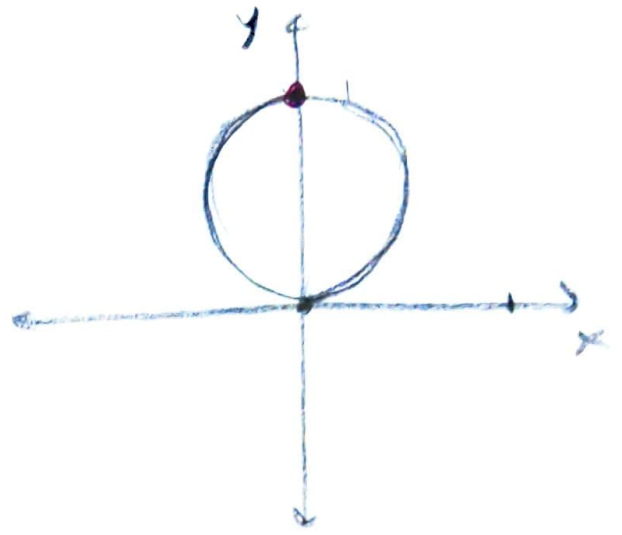
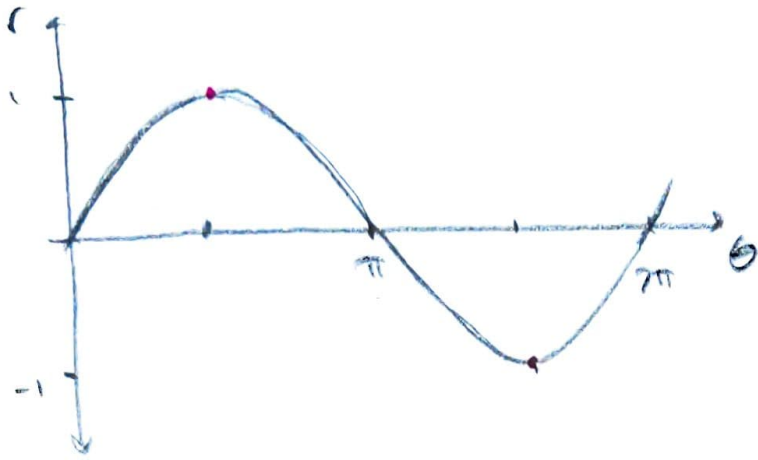


Polar curves can be plotted in Desmos by converting

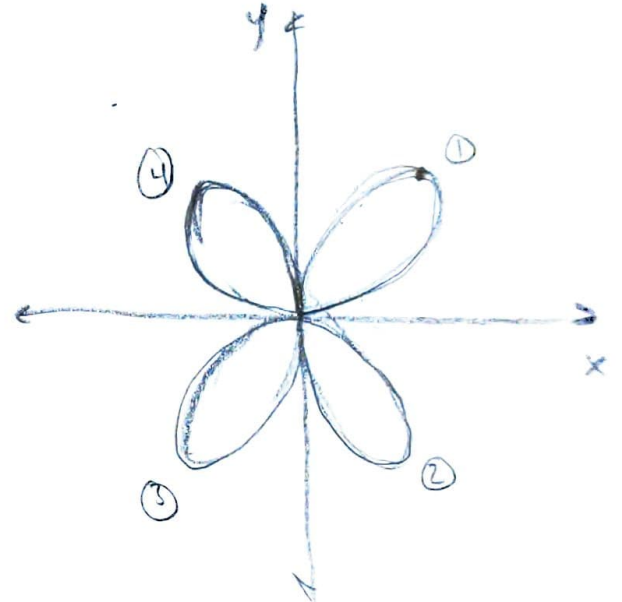
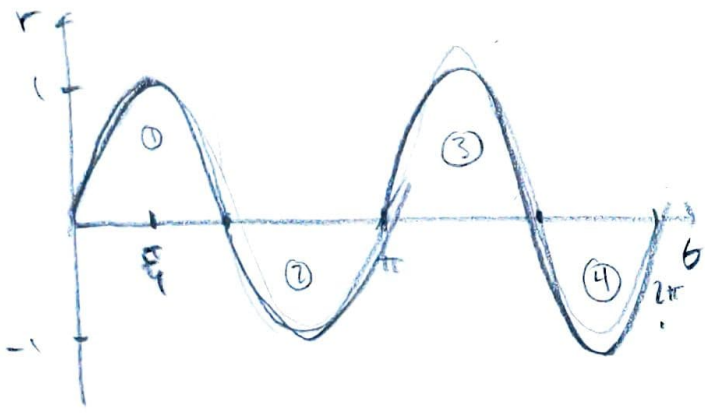
to parametric: $x = r\cos\theta$
 $y = r\sin\theta$

For example $r = 1 + 2\cos\theta$ gives $x = (1 + 2\cos t)\cos t$
 $y = (1 + 2\cos t)\sin t$
 $0 \leq t \leq 2\pi$

4. $r = \sin \theta$



$r = \sin 2\theta$



$r = \sin 3\theta$

