[2] [a] $\frac{\pi}{2} < \frac{4\pi}{5} < \pi \longrightarrow \frac{4\pi}{5} \in Q_2$ BUT $r < 0 \longrightarrow$ P IN Q_4 $\frac{1}{2}$

[b] $(9, \frac{4\pi}{5} + \pi) = (9, \frac{9\pi}{5})$ $\frac{1}{2}$

[c] $(-9, \frac{4\pi}{5} - 2\pi) = (-9, -\frac{6\pi}{5})$ $\frac{1}{2}$

[d] $(x, y) = (-9\cos\frac{4\pi}{5}, -9\sin\frac{4\pi}{5}) = (7.28, -5.29)$ $\frac{1}{2}$

[3] $r = \dfrac{\sin\theta}{2 + 1 - 2\sin^2\theta} = \dfrac{\sin\theta}{3 - 2\sin^2\theta}$ (1)

$3r - 2r\sin^2\theta = \sin\theta$ ($\frac{1}{2}$)

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

$r\left(3r - \frac{2y^2}{r}\right) = \left(\frac{y}{r}\right)r$ (1)

$3r^2 - 2y^2 = y$ ($\frac{1}{2}$)

$3(x^2+y^2) - 2y^2 = y$ ($\frac{1}{2}$)

$3x^2 + y^2 = y$ ($\frac{1}{2}$)

$r = \dfrac{\sin\theta}{2 + 2\cos^2\theta - 1} = \dfrac{\sin\theta}{1 + 2\cos^2\theta}$ (1)

$r + 2r\cos^2\theta = \sin\theta$ ($\frac{1}{2}$)

$r + 2r\left(\frac{x}{r}\right)^2 = \frac{y}{r}$

$r\left(r + \frac{2x^2}{r}\right) = \left(\frac{y}{r}\right)r$ (1)

$r^2 + 2x^2 = y$ ($\frac{1}{2}$)

$x^2 + y^2 + 2x^2 = y$ ($\frac{1}{2}$)

$3x^2 + y^2 = y$ ($\frac{1}{2}$)

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3 SOLUTIONS BASED ON WHETHER YOU USED

$\cos 2\theta = 1 - 2\sin^2\theta$

$\cos 2\theta = 2\cos^2\theta - 1$

OR $\cos 2\theta = \cos^2\theta - \sin^2\theta$

GRADE USING 1 VERSION ONLY

$r = \dfrac{\sin\theta}{2 + \cos^2\theta - \sin^2\theta}$ (1)

$2r + r\cos^2\theta - r\sin^2\theta = \sin\theta$ ($\frac{1}{2}$)

$2r + r\left(\frac{x}{r}\right)^2 - r\left(\frac{y}{r}\right)^2 = \frac{y}{r}$

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

$2r^2 + x^2 - y^2 = y$ ($\frac{1}{2}$)

$2(x^2+y^2) + x^2 - y^2 = y$ ($\frac{1}{2}$)

$3x^2 + y^2 = y$ ($\frac{1}{2}$)

[4] $a=-4, \ b=3$

$\frac{1}{2}$ $\left|\frac{a}{b}\right| = \frac{4}{3} \longrightarrow 1 < \left|\frac{a}{b}\right| < 2 \longrightarrow$ LIMACON WITH DIMPLE $\frac{1}{2}$

$\cos\theta \longrightarrow$ SYM OVER X-AXIS $\frac{1}{2}$

$b>0 \longrightarrow$ $\boxed{\text{BIGGER END ON RIGHT}\quad \text{PUCKERED END ON LEFT}}$ $\frac{1}{2}$

θ	r
0	-1
$\frac{\pi}{2}$	-4
π	-7
$\frac{3\pi}{2}$	-4

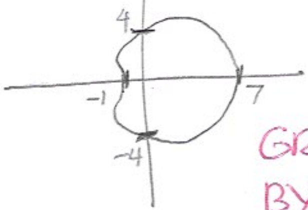
1 ← SUBTRACT $\frac{1}{2}$ POINT FOR EACH ERROR – MINIMUM SCORE = 0

→ NEG ~~POS~~ X-INT = −1

→ NEG ~~POS~~ y-INT = −4

→ POS ~~NEG~~ X-INT = 7

→ POS ~~NEG~~ y-INT = 4



GRADED BY INSTRUCTOR

[5] $\boxed{r = \dfrac{\frac{21}{5}}{1-\frac{2}{5}\cos\theta}}$ (1/2)

$\boxed{e = \frac{2}{5} \to 0 < e < 1 \to \text{ELLIPSE}}$

$ep = \frac{21}{5} \to \underline{\frac{2}{5}p = \frac{21}{5} \to p = \frac{21}{2}}$ (1/2)

$-\cos\theta \to$ DIRECTRIX $\underline{x = -\frac{21}{2}}$ (1/2)

(1/2) MUST HAVE AT LEAST 3 CORRECT VALUES TO GET ANY POINTS

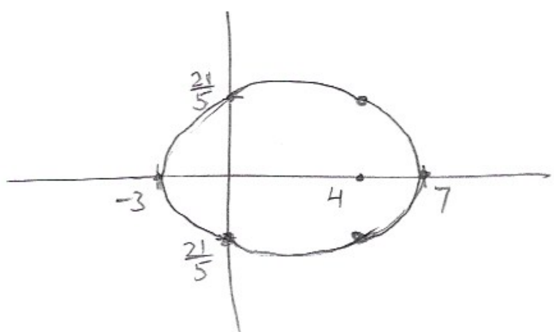
θ	r	
0	7	VERTICES $\to$ POS X-INT $= 7$
$\frac{\pi}{2}$	$\frac{21}{5}$	ENDPOINTS OF LATUS RECTUM $\to$ POS y-INT $= \frac{21}{5}$
π	3	VERTICES $\to$ NEG X-INT $= -3$
$\frac{3\pi}{2}$	$\frac{21}{5}$	ENDPOINTS OF LATUS RECTUM $\to$ NEG y-INT $= -\frac{21}{5}$

CENTER $= \left(\frac{1}{2}(7+-3), 0\right) = (2,0)$

OTHER FOCUS $= (2(2), 0) = (4,0)$

(1/2) MUST HAVE BOTH PARTS

ENDPOINTS OF OTHER LATUS RECTUM $\boxed{\left(4, \frac{21}{5}\right), \left(4, -\frac{21}{5}\right)}$ (1/2)



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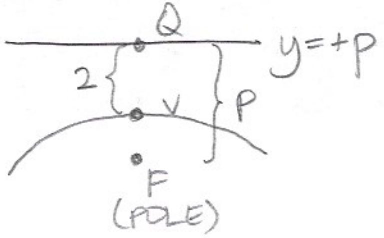
[6]



$e = \frac{VF}{VQ}$

1 $\frac{4}{3} = \frac{p-2}{2}$

$8 = 3p-6$

$14 = 3p$

$\frac{1}{2}$ $p = \frac{14}{3}$

$r = \frac{ep}{1+e\sin\theta}$ 1

$r = \frac{\frac{4}{3}\cdot\frac{14}{3}}{1+\frac{4}{3}\sin\theta}\cdot\frac{9}{9}$ $\frac{1}{2}$

$\frac{1}{2}$ $r = \frac{56}{9+12\sin\theta}$ $\frac{1}{2}$