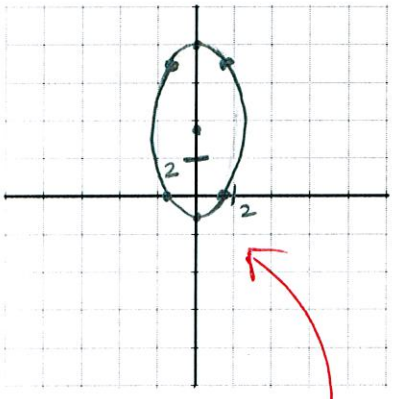
Consider the graph of the polar equation $r = \dfrac{16}{9 - 7\sin\theta}$. $= \dfrac{\frac{16}{9}}{1 - \frac{7}{9}\sin\theta}$ $\frac{7}{9}p = \frac{16}{9}$ $p = \frac{16}{7}$ **SCORE: ____ / 10 PTS**



θ	r
0	$\frac{16}{9}$
$\pi/2$	8
π	$\frac{16}{9}$
$3\pi/2$	1

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[a] Fill in the blanks.

[i] The eccentricity is $\frac{7}{9}$. (1)

[ii] The shape of the graph is a/an ELLIPSE (1)

[iii] The equation of the directrix is $y = -\frac{16}{7}$ (1)

[iv] Find the **rectangular** coordinates of the

x – intercept(s) (½) $(\pm\frac{16}{9}, 0)$

y – intercept(s) (½) $(0, 8)$ $(0, -1)$

vertex/vertices (1) $(0, 8)$ $(0, -1)$

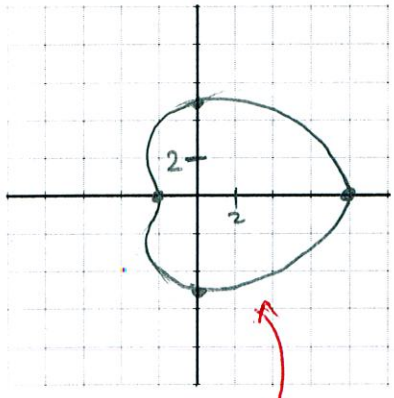
center (1) $(0, \frac{7}{2})$

focus/foci (1) $(0, 7)$ $(0, 0)$

endpoints of the latus rectum/latera recta (1) $(\pm\frac{16}{9}, 7)$ $(\pm\frac{16}{9}, 0)$

[b] Sketch the graph on the grid provided above. **You must provide a scale for the axes & plot all points from part [a][iv] above.**

Consider the graph of the polar equation $r = 5 + 3\cos\theta$. $|3| < |5| < 2|3|$ **SCORE: ____ / 6 PTS**



θ	r
0	8
$\pi/2$	5
π	2
$3\pi/2$	5

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[a] Fill in the blanks.

[i] The shape of the graph is a/an LIMACON WITH DIMPLE (1)

[ii] The graph DOES NOT (1) pass through the pole.
(does / does not)

[iii] Find the **rectangular** coordinates of the

x – intercept(s) (1) $(8, 0)$ $(-2, 0)$

y – intercept(s) (1) $(0, \pm 5)$

[b] Sketch the graph on the grid provided above. **You must provide a scale for the axes & plot all points from part [a][iii] above.**

Consider the graph of the polar equation $r = 1 - 2\cos 2\theta$. **SCORE: ____ / 14 PTS**

[a] **Using the tests and shortcuts shown in lecture**, determine if the graph is symmetric over the polar axis, $\theta = \frac{\pi}{2}$ and/or the pole. Summarize your conclusions in the table on the right. **NOTE: Run as FEW tests as needed to prove your conclusions are correct.**

$(r, -\theta)$: $r = 1 - 2\cos 2(-\theta)$ (1)
$= 1 - 2\cos(-2\theta)$
$= 1 - 2\cos 2\theta$ (1) SYM OVER POLAR AXIS

$(r, \pi - \theta)$: $r = 1 - 2\cos 2(\pi - \theta)$ (1)
$= 1 - 2\cos(2\pi - 2\theta)$
$= 1 - 2[\cos 2\pi \cos 2\theta + \sin 2\pi \sin 2\theta]$
$= 1 - 2\cos 2\theta$ (1) SYM OVER $\theta = \frac{\pi}{2}$

AUTOMATICALLY SYMMETRIC OVER POLE (1)

Type of symmetry	Conclusion
Over the polar axis	SYMMETRIC
Over $\theta = \frac{\pi}{2}$	SYMMETRIC
Over the pole	SYMMETRIC

($\frac{1}{2}$) POINT IF 1 CORRECT
(1$\frac{1}{2}$) POINTS IF 2 CORRECT
(2$\frac{1}{2}$) POINTS IF ALL CORRECT

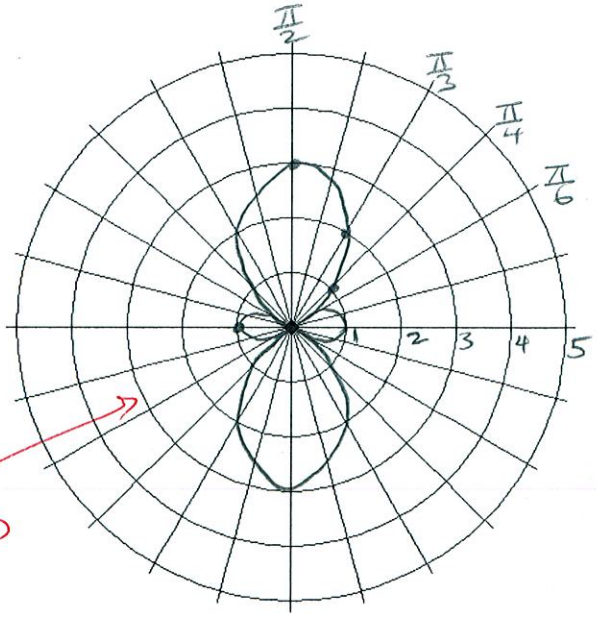
[b] Based on the results of part [a], what is the minimum interval of the graph you need to plot (before using reflections to draw the rest of the graph) ?

$\theta \in [0, \frac{\pi}{2}]$ (1)

[c] Find the value of r for all common values of θ in the interval from part [b].

θ	r
0	−1
$\pi/6$	0
$\pi/4$	1
$\pi/3$	2
$\pi/2$	3

($\frac{1}{2}$) EACH = (2$\frac{1}{2}$) TOTAL



GRADED BY ME

[d] Sketch the graph on the grid provided below. **You must provide a scale for the polar axis & plot all points from part [c] above.**