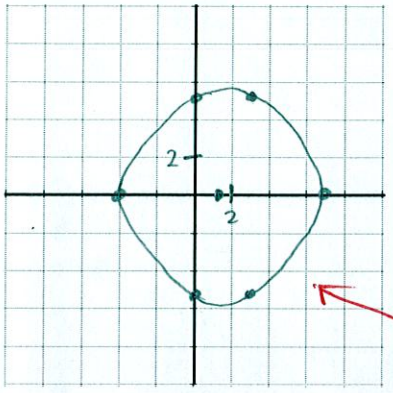
Consider the graph of the polar equation $r = \dfrac{56}{11-3\cos\theta}$. $= \dfrac{\frac{56}{11}}{1-\frac{3}{11}\cos\theta}$

SCORE: ____ / 10 PTS



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θ	r
0	7
$\frac{\pi}{2}$	$\frac{56}{11}$
π	4
$\frac{3\pi}{2}$	$\frac{56}{11}$

[a] Fill in the blanks.

[i] The eccentricity is $\frac{3}{11}$ (1).

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

[iii] The equation of the directrix is $x = -\frac{56}{3}$ (1) $\quad \frac{3}{11}p = \frac{56}{11} \rightarrow p = \frac{56}{3}$

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

x – intercept(s): $(7,0)\ (-4,0)$ ($\frac{1}{2}$)

y – intercept(s): $(0, \pm\frac{56}{11})$ ($\frac{1}{2}$)

vertex/vertices (1): $(7,0)\ (-4,0)$

center (1): $(\frac{3}{2}, 0)$

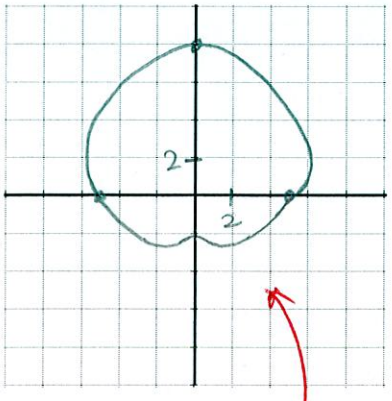
focus/foci (1): $(0,0)\ (3,0)$

endpoints of the latus rectum/latera recta (1): $(0, \pm\frac{56}{11})\ (3, \pm\frac{56}{11})$

[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 $r = 5 + 3\sin\theta$. $1 < |\frac{5}{3}| < 2$

SCORE: ____ / 6 PTS



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θ	r
0	5
$\frac{\pi}{2}$	8
π	5
$\frac{3\pi}{2}$	2

[a] Fill in the blanks.

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

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

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

x – intercept(s): $(\pm 5, 0)$ (1)

y – intercept(s): $(0,8)\ (0,-2)$ (1)

[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 $r = 4 - 6\cos 2\theta$.

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.**

$(r, -\theta)$: $r = 4 - 6\cos 2(-\theta)$ (1)

$r = 4 - 6\cos(-2\theta)$

(1) $r = 4 - 6\cos 2\theta$, SYM OVER POLAR AXIS

$(r, \pi - \theta)$: $r = 4 - 6\cos 2(\pi - \theta)$ (1)

$r = 4 - 6\cos(2\pi - 2\theta)$

$r = 4 - 6[\cos 2\pi \cos 2\theta + \sin 2\pi \sin 2\theta]$

(1) $r = 4 - 6\cos 2\theta$, SYM OVER $\theta = \frac{\pi}{2}$

$(r, \pi + \theta)$: $r = 4 - 6\cos 2(\pi + \theta)$ (1)

ALSO OK IF ONE OF THESE 3 TESTS REPLACED WITH "AUTOMATICALLY SYMMETRIC"

$r = 4 - 6\cos(2\pi + 2\theta)$

$r = 4 - 6[\cos 2\pi \cos 2\theta - \sin 2\pi \sin 2\theta]$

(1) $r = 4 - 6\cos 2\theta$ SYM OVER POLE

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

(1) IF YOU GOT 2 RIGHT

(2) IF YOU GOT ALL 3 RIGHT

(0) IF YOU GOT ONLY 1 RIGHT

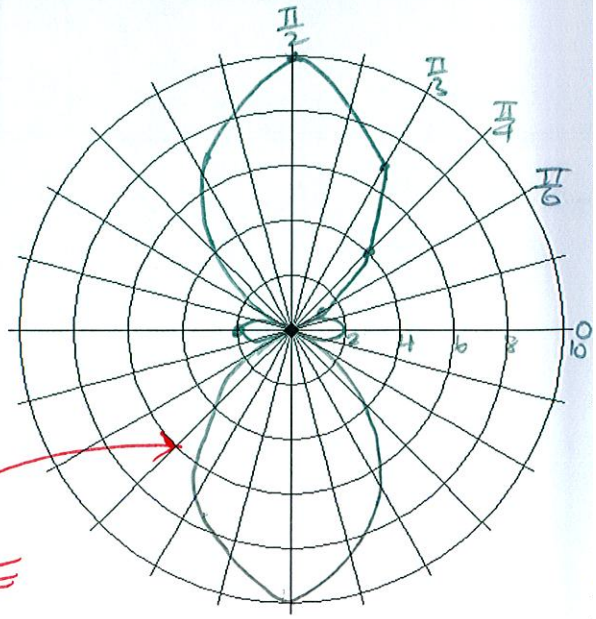
[b] Based on the results of part [a], what is the minimum interval of the graph you need to plot (before using reflections to draw the rest of the graph) ?

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

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

θ	r
0	-2
$\frac{\pi}{6}$	1
$\frac{\pi}{4}$	4
$\frac{\pi}{3}$	7
$\frac{\pi}{2}$	10

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



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[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. NOTE: r = 0 for some θ between 0 and π/2, but not in your list of angles in [c]. You do NOT need to find that θ.**