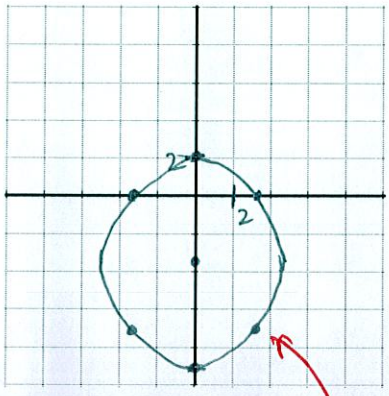
Consider the graph of the polar equation $r = \dfrac{36}{11+7\sin\theta}$. $= \dfrac{\frac{36}{11}}{1+\frac{7}{11}\sin\theta}$

SCORE: ____ / 10 PTS



[a] Fill in the blanks.

[i] The eccentricity is $\frac{7}{11}$ (1)

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

[iii] The equation of the directrix is $y = \frac{36}{7}$ (1)

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

x – intercept(s) $(\pm\frac{36}{11}, 0)$ ($\frac{1}{2}$)

y – intercept(s) $(0,2)\ (0,-9)$ ($\frac{1}{2}$)

vertex/vertices (1) $(0,2)\ (0,-9)$

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

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

endpoints of the latus rectum/latera recta (1) $(\pm\frac{36}{11},0)\ (\pm\frac{36}{11},-7)$

θ	r
0	$\frac{36}{11}$
$\frac{\pi}{2}$	2
π	$\frac{36}{11}$
$\frac{3\pi}{2}$	9

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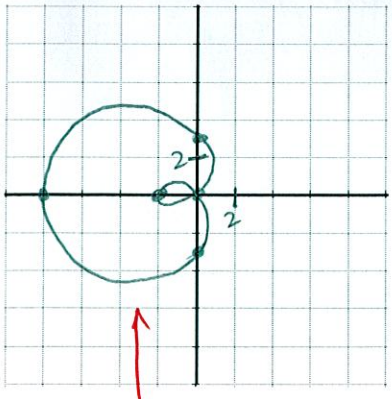
[b] Sketch the graph on the grid provided above. **You must provide a scale for the axes & plot all points from part [a][iv] above.**

Consider the graph of the polar equation $r = 3 - 5\cos\theta$. $|\frac{3}{5}| < 1$

SCORE: ____ / 6 PTS



[a] Fill in the blanks.

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

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

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

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

y – intercept(s) $(0,\pm 3)\ (0,0)$ (1)

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

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[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 $r = 3 - 4\cos 2\theta$.

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.**

$(r, -\theta)$: $r = 3 - 4\cos 2(-\theta)$ (1)

$r = 3 - 4\cos(-2\theta)$

$r = 3 - 4\cos 2\theta$ SYM OVER POLAR AXIS (1)

$(r, \pi - \theta)$: $r = 3 - 4\cos 2(\pi - \theta)$ (1)

$r = 3 - 4\cos(2\pi - 2\theta)$

$r = 3 - 4[\cos 2\pi \cos 2\theta + \sin 2\pi \sin 2\theta]$

$r = 3 - 4\cos 2\theta$ (1) SYM OVER $\theta = \frac{\pi}{2}$

$(r, \pi + \theta)$: $r = 3 - 4\cos 2(\pi + \theta)$ (1)

$r = 3 - 4\cos(2\pi + 2\theta)$

$r = 3 - 4[\cos 2\pi \cos 2\theta - \sin 2\pi \sin 2\theta]$

$r = 3 - 4\cos 2\theta$, SYM OVER POLE (1)

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

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

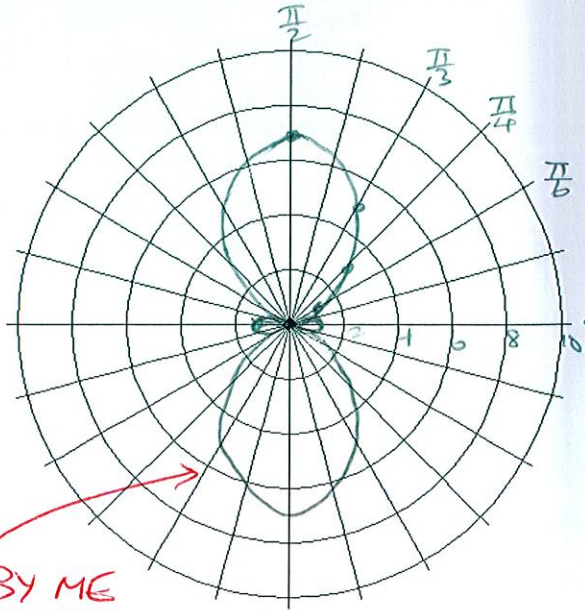
[b] Based on the results of part [a], what is the minimum interval of the graph you need to plot (before using reflections to draw the rest of the graph) ?

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

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

θ	r
0	-1
$\frac{\pi}{6}$	1
$\frac{\pi}{4}$	3
$\frac{\pi}{3}$	5
$\frac{\pi}{2}$	7

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



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. 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.**