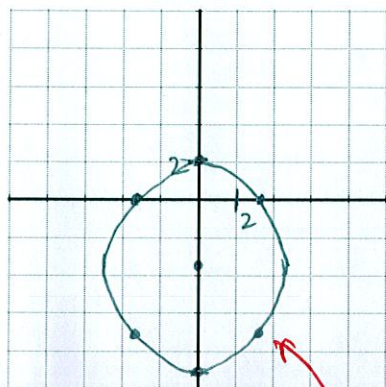


Consider the graph of the polar equation $r = \frac{36}{11 + 7 \sin \theta}$. $= \frac{\frac{36}{11}}{1 + \frac{7}{11} \sin \theta}$

SCORE: ____ / 10 PTS



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

GRADED BY ME

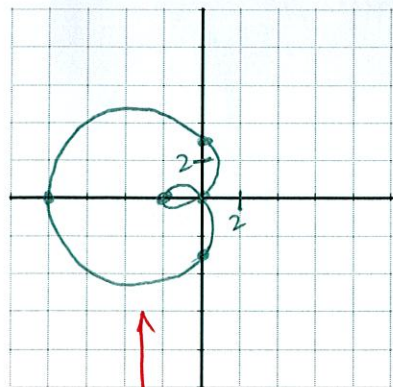
[a] Fill in the blanks.

- [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) $(\pm \frac{36}{11}, 0)$ ①
- y - intercept(s) $(0, 2)$ $(0, -9)$ ①
- 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 $(\pm \frac{36}{11}, 0)$ $(\pm \frac{36}{11}, -7)$

[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 $r = 3 - 5 \cos \theta$. $|\frac{5}{3}| > 1$

SCORE: ____ / 6 PTS



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[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

[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.**

$(r, -\theta): r = 3 - 4 \cos 2(-\theta) \quad \textcircled{1}$
 $r = 3 - 4 \cos(-2\theta)$
 $r = 3 - 4 \cos 2\theta$ SYM OVER POLAR AXIS

$(r, \pi - \theta): r = 3 - 4 \cos 2(\pi - \theta) \quad \textcircled{1}$
 $r = 3 - 4 \cos(2\pi - 2\theta)$
 $r = 3 - 4 [\cos 2\pi \cos 2\theta + \sin 2\pi \sin 2\theta]$
 $r = 3 - 4 \cos 2\theta$ SYM OVER $\theta = \frac{\pi}{2}$

$(r, \pi + \theta): r = 3 - 4 \cos 2(\pi + \theta) \quad \textcircled{1}$
 $r = 3 - 4 \cos(2\pi + 2\theta)$
 $r = 3 - 4 [\cos 2\pi \cos 2\theta - \sin 2\pi \sin 2\theta]$
 $r = 3 - 4 \cos 2\theta$ SYM OVER POLE

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
 ③ IF YOU GOT ONLY 1 RIGHT

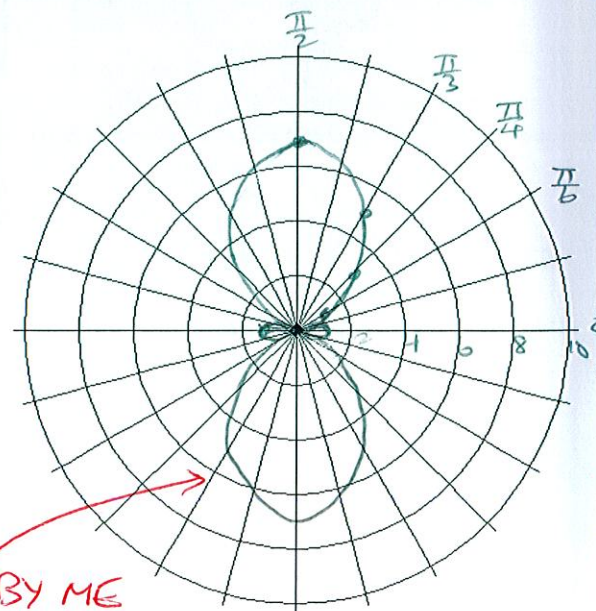
- [b] Based on the results of part [a], what is the minimum interval of the graph you need to plot (before using reflections to draw the rest of the graph)?

$[0, \frac{\pi}{2}] \quad \textcircled{1}$

- [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

① EACH
 (TOTAL = $2\frac{1}{2}$)



- [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 $\pi/2$, but not in your list of angles in [c]. You do NOT need to find that θ .**