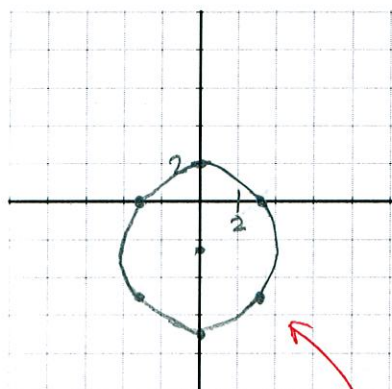Consider the graph of the polar equation $r = \dfrac{28}{9+5\sin\theta} = \dfrac{\frac{28}{9}}{1+\frac{5}{9}\sin\theta}$

$\frac{5}{9}p = \frac{28}{9}$

$p = \frac{28}{5}$

SCORE: _____ / 10 PTS

[a]   Fill in the blanks.

  [i]   The eccentricity is $\dfrac{5}{9}$ ①

  [ii]   The shape of the graph is a/an ___ELLIPSE___ ①

  [iii]   The equation of the directrix is $y = \dfrac{28}{5}$ ①

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

x − intercept(s)	½ $\left(\pm\dfrac{28}{9}, 0\right)$
y − intercept(s)	½ $(0,2)$ $(0,-7)$
vertex/vertices	① $(0,2)$ $(0,-7)$
center	① $\left(0, -\dfrac{5}{2}\right)$
focus/foci	① $(0,-5)$ $(0,0)$
endpoints of the latus rectum/latera recta	① $\left(\pm\dfrac{28}{9},-5\right)$ $\left(\pm\dfrac{28}{9}, 0\right)$

θ	r
0	$28/9$
$\pi/2$	2
π	$28/9$
$3\pi/2$	7

GRADED BY ME

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

$|6| > 2|2|$

SCORE: _____ / 6 PTS
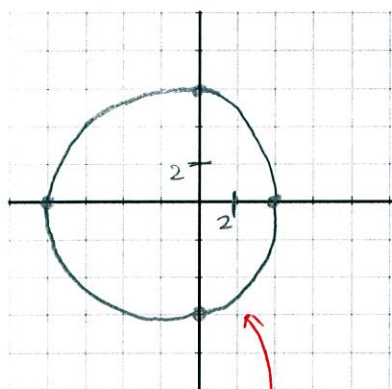
[a]   Fill in the blanks.

  [i]   The shape of the graph is a/an ___CONVEX LIMACON___ ①

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

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

x − intercept(s)	① $(4,0)$ $(-8,0)$
y − intercept(s)	① $(0,\pm6)$

θ	r
0	4
$\pi/2$	6
π	8
$3\pi/2$	6

GRADED BY ME

[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 SYM OVER POLE ①

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

$\left(\frac{1}{2}\right)$ POINT IF 1 CORRECT

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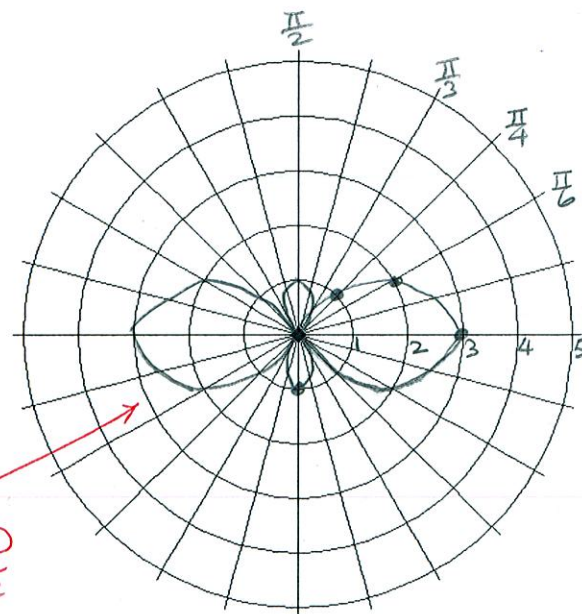
$\left(2\frac{1}{2}\right)$ POINTS IF ALL CORRECT

[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)?

$\theta \in \left[0, \frac{\pi}{2}\right]$ ①

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

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

$\left(\frac{1}{2}\right)$ EACH $= \left(2\frac{1}{2}\right)$ 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.**