CENGAGE | WEBASSIGN

davidcorzo@ufm.edu (sign out)

Home My Assignments Grades Communication
Calendar
My eBooks

MC 006, section B, Fall 2019

INSTRUCTOR
Christiaan Ketelaar
Universidad Francisco Marroquin

10.4 Áreas Coordenadas Polares (Homework)

Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
POINTS	–/2	–/2	–/2	–/2	–/2	–/2	–/2	–/2	–/2	–/0	–/0	–/2	–/2	–/0	–/2	–/2	–/2	–/2

TOTAL SCORE

–/30 0.0%

Due Date

DECEMBER 21
11:59 PM CST

Request Extension

Assignment Submission & Scoring

Assignment Submission

For this assignment, you submit answers by question parts. The number of submissions remaining for each question part only changes if you submit or change the answer.

Assignment Scoring

Your last submission is used for your score.

---

1. –/2 points SCalcET8 10.4.001. My Notes Ask Your Teacher

Find the area of the region that is bounded by the given curve and lies in the specified sector.

$r = e^{-\theta/12}, \quad \pi/2 \le \theta \le \pi$

2. –/2 points SCalcET8 10.4.002. My Notes Ask Your Teacher

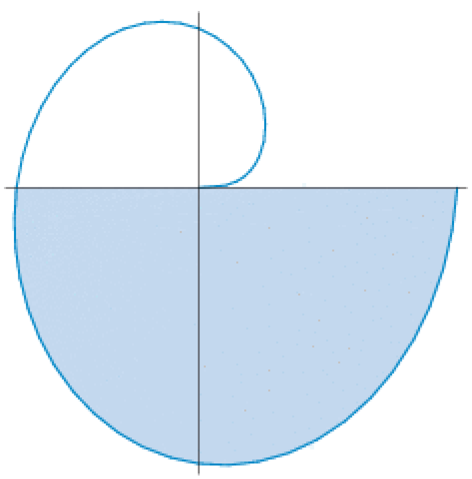
Find the area of the region that is bounded by the given curve and lies in the specified sector.

$r = 4\cos(\theta), \quad 0 \le \theta \le \pi/6$

3. –/2 points SCalcET8 10.4.501.XP. My Notes Ask Your Teacher

Find the area of the shaded region.

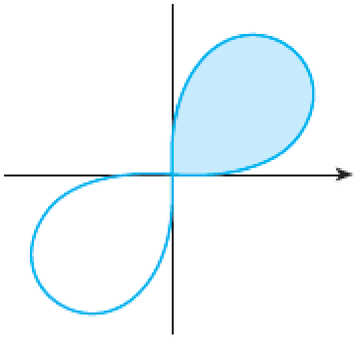
$r = \sqrt{\theta}$



4. –/2 points SCalcET8 10.4.005. My Notes Ask Your Teacher

Find the area of the shaded region.

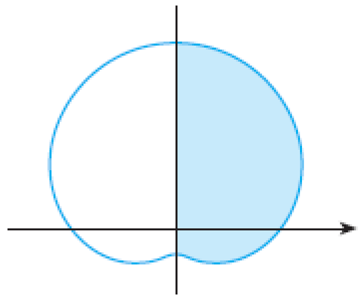
$r^2 = \sin(2\theta)$



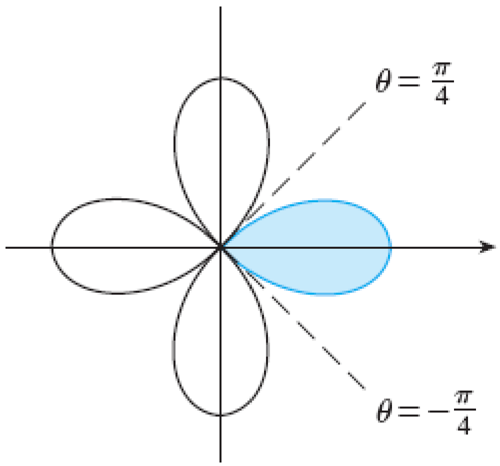
5. –/2 points SCalcET8 10.4.007. My Notes Ask Your Teacher

Find the area of the shaded region.

$r = 4 + 3\sin(\theta)$



6. –/2 points SCalcET8 10.4.AE.001. My Notes Ask Your Teacher



Video Example

EXAMPLE 1 Find the area enclosed by one loop of the four-leafed rose $r = 3\cos(2\theta)$.

SOLUTION The curve $r = 3\cos(2\theta)$ is sketched in the figure to the left. Notice from the figure that the region enclosed by the right loop is swept out by a ray that rotates from $\theta = -\pi/4$ to $\theta = \pi/4$. Therefore this formula gives

$$A = \int_{-\pi/4}^{\pi/4} \frac{1}{2} r^2 \, d\theta$$

$$= \frac{1}{2} \int_{-\pi/4}^{\pi/4} \left(\quad \right) d\theta$$

$$= 9 \int_{0}^{\pi/4} \left(\quad \right) d\theta$$

$$= 9 \int_{0}^{\pi/4} \frac{1}{2}(1 + \cos(4\theta)) \, d\theta$$

$$= \frac{9}{2} \Big[\quad \Big]_{0}^{\pi/4}$$

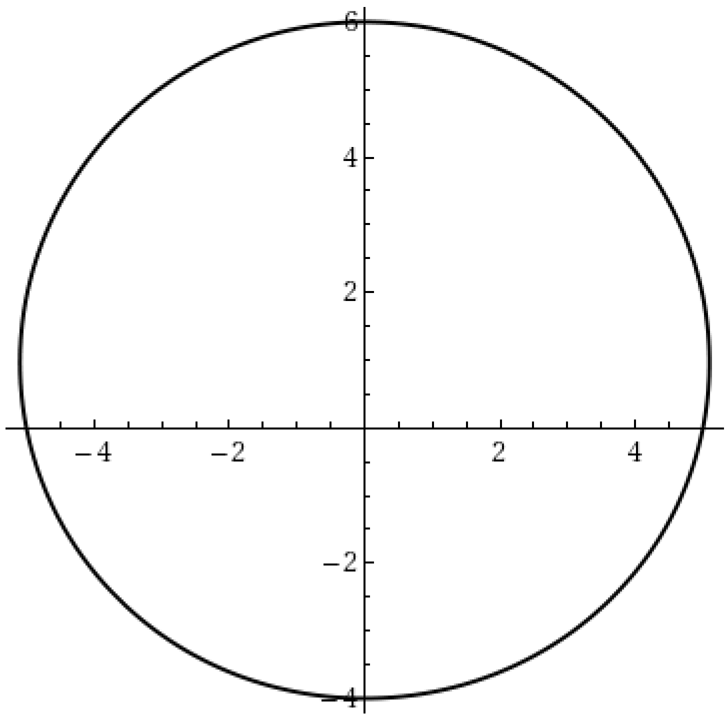
$$=$$

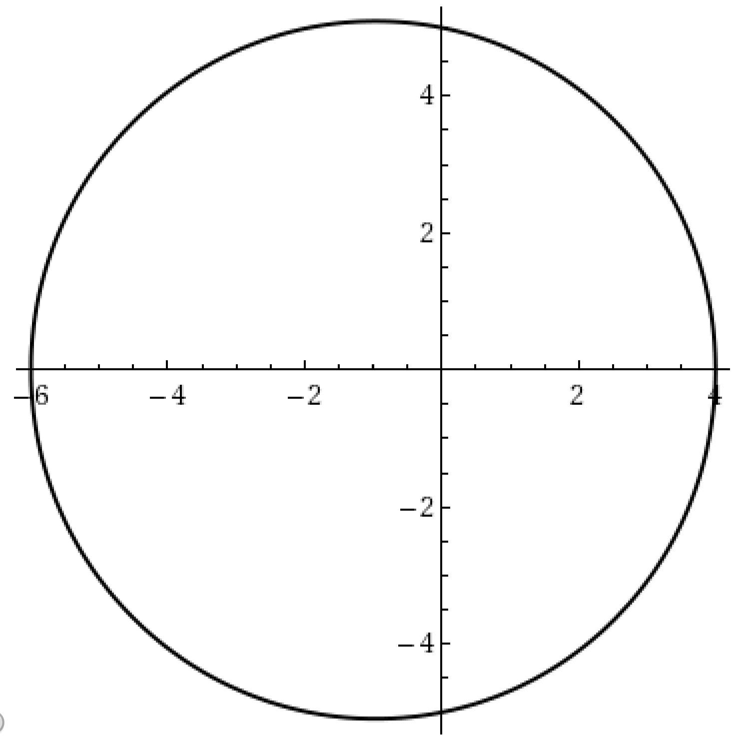
.

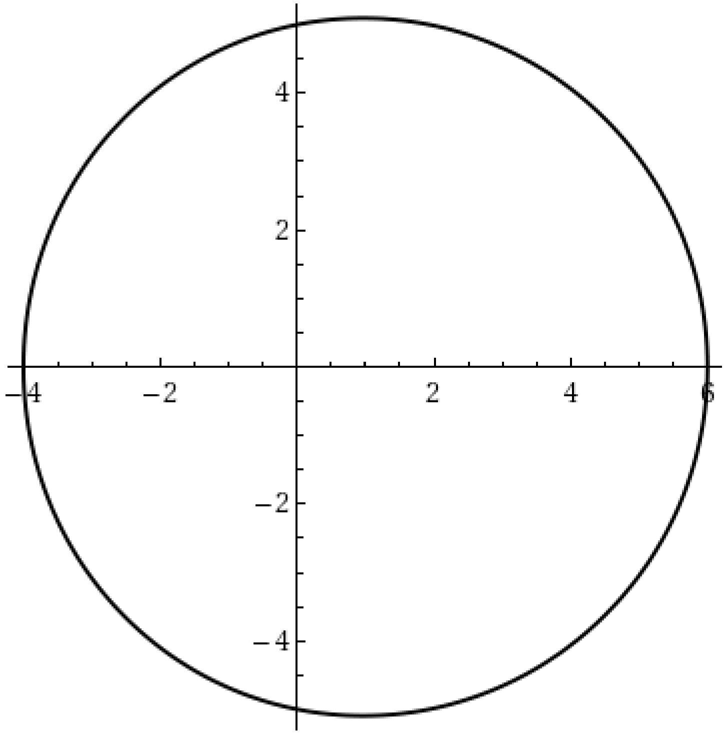
7. –/2 points SCalcET8 10.4.010. My Notes Ask Your Teacher

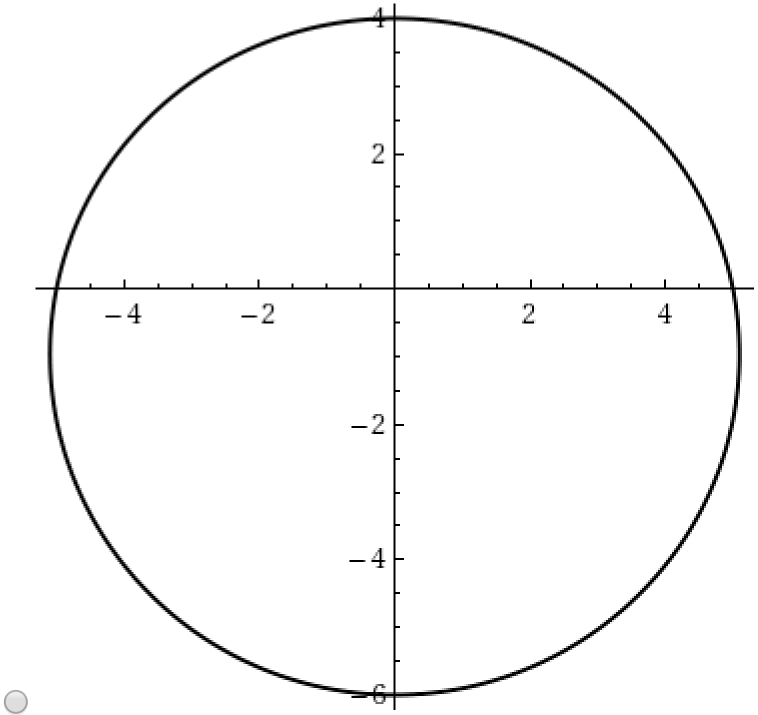
Sketch the curve.

$r = 5 - \sin(\theta)$







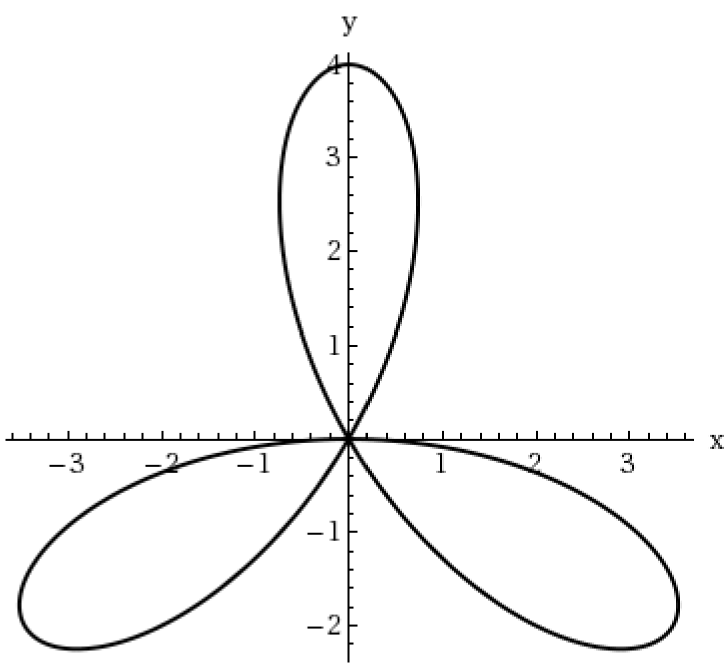


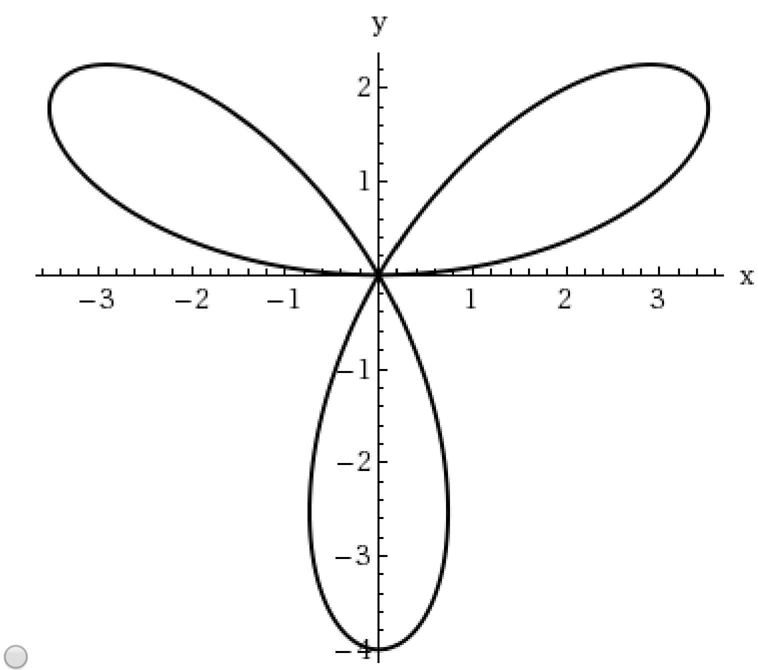
Find the area that it encloses.

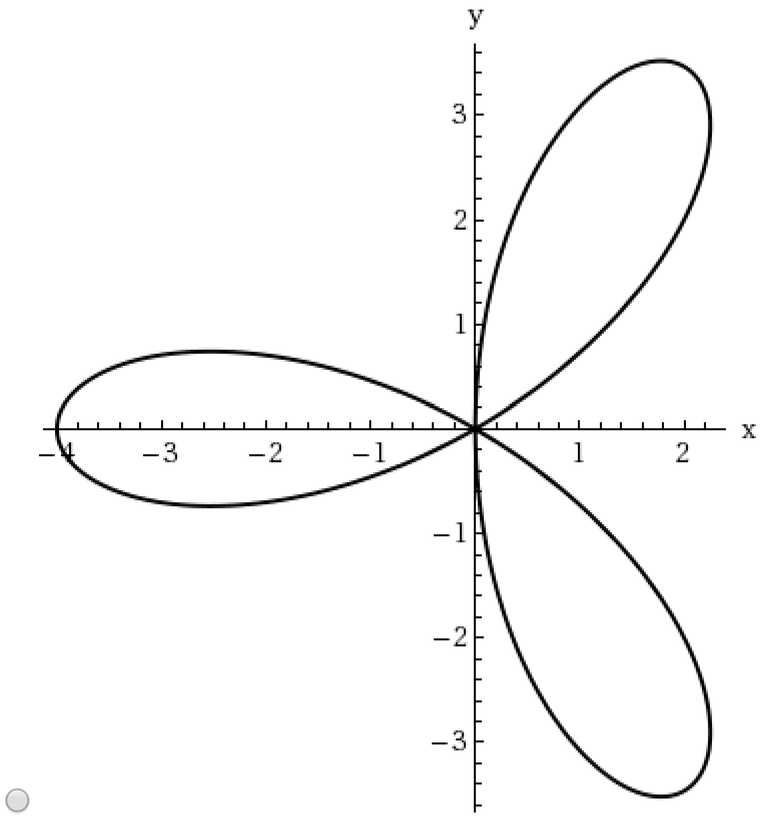
8. –/2 points SCalcET8 10.4.512.XP. My Notes Ask Your Teacher

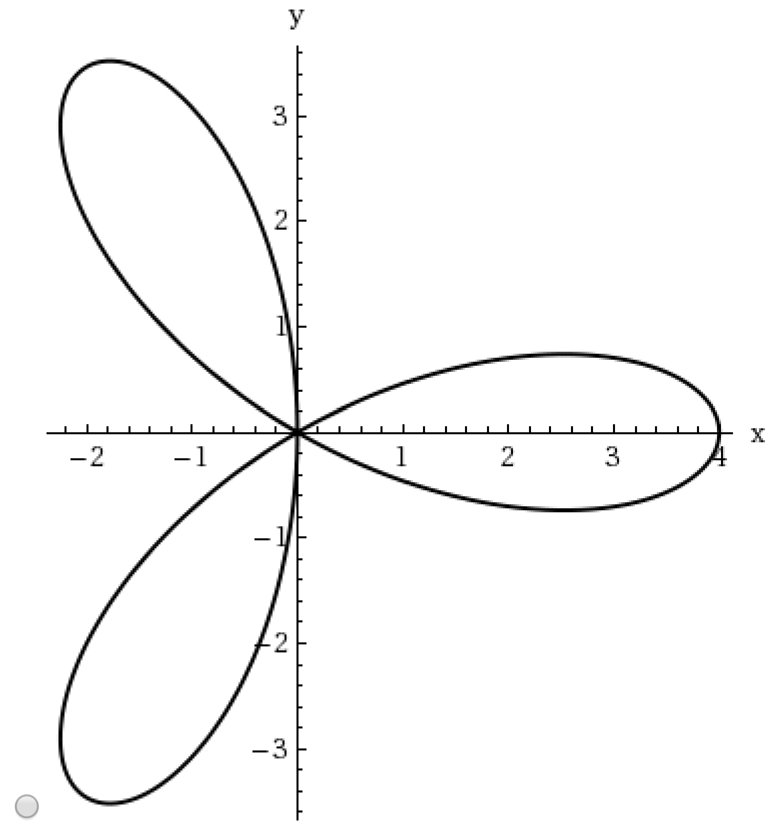
Find the area that the curve encloses and then sketch it.

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







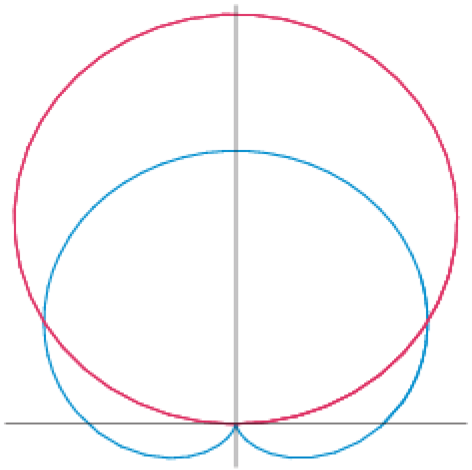


9. –/2 points SCalcET8 10.4.019. My Notes Ask Your Teacher

Find the area of the region enclosed by one loop of the curve.

$r = \sin(10\theta)$

10. –/0 points SCalcET8 10.4.AE.002. My Notes Ask Your Teacher



Video Example

EXAMPLE 2 Find the area of the region that lies inside the circle $r = 12\sin(\theta)$ and outside the cardioid $r = 4 + 4\sin(\theta)$.

SOLUTION The cardioid (in blue) and the circle (in red) are sketched in the figure. The value of a and b in this formula are determined by finding the points of intersection of the two curves. They intersect when $12\sin(\theta) =$ [ ] , [ ] which gives $\sin(\theta) =$ [ ] , so $\theta = \pi/6$, $\theta = 5\pi/6$. The desired area can be found by subtracting the area inside the cardioid between $\theta = \pi/6$, $5\pi/6$ from the area inside the circle from $\pi/6$ to $5\pi/6$. Thus

$$A = \frac{1}{2}\int_{\pi/6}^{5\pi/6} (12\sin(\theta))^2\, d\theta - \frac{1}{2}\int_{\pi/6}^{5\pi/6} (4 + 4\sin(\theta))^2\, d\theta.$$

Since the region is symmetric about the vertical axis $\theta = \pi/2$, we can write

$$A = 2\left[\frac{1}{2}\int_{\pi/6}^{\pi/2} 144\sin^2(\theta)\, d\theta - \frac{16}{2}\int_{\pi/6}^{\pi/2} (1 + 2\sin(\theta) + \sin^2(\theta))\, d\theta\right]$$

$$= \int_{\pi/6}^{\pi/2} \left[128\sin^2(\theta) - 16 - \square\ \square\right] d\theta$$

$$= \int_{\pi/6}^{\pi/2} \left(\square - 64\cos(2\theta) - \square\sin(\theta)\right) d\theta$$

[because $\sin^2(\theta) = \frac{1}{2}(1 - \cos(2\theta))$]

$=$

$\Big|_{\pi/6}^{\pi/2}$

=

.

11. –/0 points SCalcET8 10.4.024. My Notes Ask Your Teacher

Find the area of the region that lies inside the first curve and outside the second curve.

$r = 7 - 7\sin(\theta), \quad r = 7$

12. –/2 points SCalcET8 10.4.026. My Notes Ask Your Teacher

Find the area of the region that lies inside the first curve and outside the second curve.

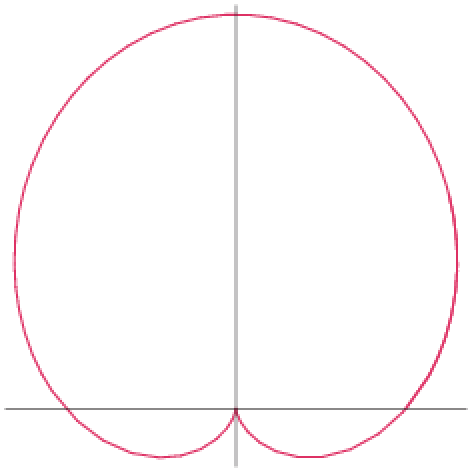
$r = 1 + \cos(\theta), \quad r = 2 - \cos(\theta)$

13. –/2 points SCalcET8 10.4.030. My Notes Ask Your Teacher

Find the area of the region that lies inside both curves.

$r = 4 + \cos(\theta), \quad r = 4 - \cos(\theta)$

14. –/0 points SCalcET8 10.4.AE.004. My Notes Ask Your Teacher



Video Example

EXAMPLE 4 Find the length of the cardioid $r = 6 + 6\sin(\theta)$.

SOLUTION The cardioid is shown in the figure. Its full length is given by the parameter interval $0 \le \theta \le 2\pi$, so

$$L = \int_0^{2\pi} \sqrt{r^2 + \left(\frac{dr}{d\theta}\right)^2}\, d\theta$$

$$= \int_0^{2\pi} \sqrt{(6 + 6\sin(\theta))^2 + \left(\quad\right)^2}\, d\theta$$

$$= \int_0^{2\pi} \quad d\theta$$

We could evaluate this integral by multiplying and dividing the integrand by $\sqrt{2 - 2\sin(\theta)}$, or we could use a computer algebra system. In any event, we find

$L =$

that the length of the cardioid is .

15. –/2 points SCalcET8 10.4.047. My Notes Ask Your Teacher

Find the exact length of the polar curve.

$r = \theta^2, \quad 0 \le \theta \le 3\pi/4$

16. –/2 points SCalcET8 10.4.050. My Notes Ask Your Teacher

Find the exact length of the curve. Use a graph to determine the parameter interval.

$r = \cos^2(\theta/2)$

17. –/2 points SCalcET8 10.4.516.XP. My Notes Ask Your Teacher

Find the exact length of the polar curve.

$r = e^{8\theta}, \quad 0 \le \theta \le 2\pi$

18. –/2 points SCalcET8 10.4.518.XP. My Notes Ask Your Teacher

Find the area of the region that is bounded by the given curve and lies in the specified sector.

$r = e^{\theta/2}, \quad \pi/4 \leq \theta \leq 4\pi/3$

Submit Assignment Save Assignment Progress

Home My Assignments Extension Request