



MATH 152 - WEEK-IN-REVIEW 10

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PROBLEM STATEMENTS

You should attempt the problems yourself first. The next section contains the solutions.

1. Sketch the region in the plane consisting of points whose polar coordinates satisfy the given conditions.
 - a. $1 < r < 5$, $5\pi/3 \leq \theta \leq 7\pi/3$
 - b. $r = \theta$, $\theta \geq 0$
2. Find a polar equation for the Cartesian equation given by $xy = 10$.
3. Find the Cartesian equation for the polar equation given by $r = 5 \sin(\theta)$.
4. Find the area of the region $r = \sqrt{\theta}$ when $3\pi/2 \leq \theta \leq 2\pi$.
5. Find the area of the region $r = e^{\theta/2}$ when $\pi/6 \leq \theta \leq 3\pi/2$.
6. Find the area enclosed by one loop of the curve $r = \sin(12\theta)$.
7. Find the area of the region enclosed by the curve $r = 3 \cos(5\theta)$.
8. Find the area of the region that lies within $r = 3 - 3 \sin(\theta)$ but outside of the region given by $r = 3$.



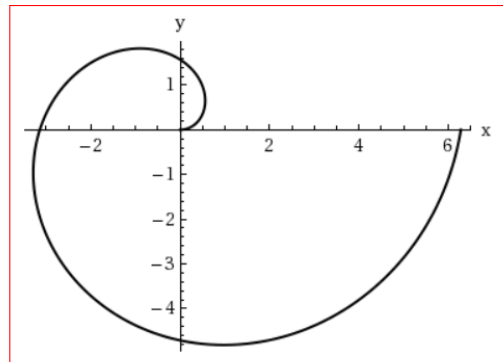
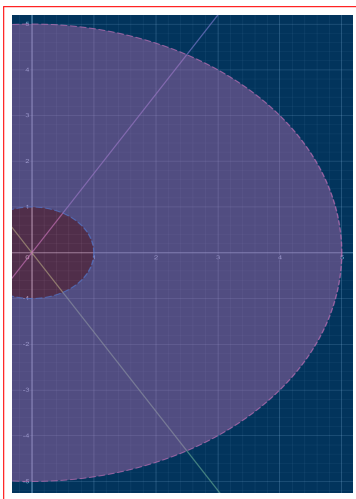
SOLUTIONS

Click the boxed answer (also in red) to watch the video solution. Note any video errata. You can also see them all by viewing the [Week 10 playlist \(clickable link\)](#). You can turn on closed captions by clicking “CC” inside YouTube as well as adjust the video speed inside of “Settings” by clicking the cog in the bottom right of the player.

1. Sketch the region in the plane consisting of points whose polar coordinates satisfy the given conditions.

a. $1 < r < 5, 5\pi/3 \leq \theta \leq 7\pi/3$

b. $r = \theta, \theta \geq 0$



2. Find a polar equation for the Cartesian equation given by $xy = 10$.

$$r^2 = \frac{10}{\sin(\theta) \cos(\theta)}$$

3. Find the Cartesian equation for the polar equation given by $r = 5 \sin(\theta)$.

$$(x)^2 + \left(y - \frac{5}{2}\right)^2 = \frac{25}{4}$$

4. Find the area of the region $r = \sqrt{\theta}$ when $3\pi/2 \leq \theta \leq 2\pi$.

$$\frac{7\pi^2}{16}$$

5. Find the area of the region $r = e^{\theta/2}$ when $\pi/6 \leq \theta \leq 3\pi/2$.

$$\frac{e^{3\pi/2} - e^{\pi/6}}{2}$$



6. Find the area enclosed by one loop of the curve $r = \sin(12\theta)$.

$$\frac{\pi}{48}$$

7. Find the area of the region enclosed by the curve $r = 3 \cos(5\theta)$.

$$\frac{9\pi}{4}$$

8. Find the area of the region that lies within $r = 3 - 3 \sin(\theta)$ but outside of the region given by $r = 3$.

$$\frac{72 - 9\pi}{4}$$