Math 1432

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Office Hours:
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Class webpage:
www.casa.uh.edu
1. The polar plot of $r = 2 + 2 \cos \theta$ is a
2. The polar plot of $r = 5 - 2 \cos \theta$ is a
3. The polar plot of $r = 7 - 12 \cos \theta$ is a
4. The polar plot of $r = 2 \cos 5\theta$ is a
5. The polar plot of $r = 4 \cos \theta$ is a
6. Give the formula for the area of the region that is enclosed by the polar curve \( r = 1 + 2\sin(\theta) \) and lies \textbf{below the x-axis.}
7. Re-write \((x - 3)^2 + y^2 = 9\) in polar form
**Parametric Curves**

Parametric equations are sets of equations that are used to express quantities explicitly in terms of another variable.

So, instead of using \( y = f(x) \) (defining \( y \) in terms of \( x \)), we let \( x(t) \) and \( y(t) \) be functions where \( t \) is the parameter.

Then \((x(t), y(t))\) is the point that traces out the curve.

If \( t \) is restricted to lie on an interval \([a, b]\) then \( x(t) \) and \( y(t) \) would have an initial point \((x(a), y(a))\) and a terminal point \((x(b), y(b))\). So a parametric curve has an orientation given by the parameterizing variable.
Ex. 1: Plot \((\cos(t), \sin(t))\) for \(0 \leq t \leq 2\pi\) and express the curve by an equation in \(x\) and \(y\).
Ex. 2: Sketch the curve and eliminate the parameter.

\[ x(\theta) = 3 \cos (\theta) \quad y(\theta) = 4 \sin (\theta) \quad 0 \leq \theta \leq 2\pi \]
Ex. 3: Give a parameterization of the PORTION of the line $y = -2x + 5$ between (1, 3) and (-2, 9)
To parameterize a line SEGMENT from \((x_0, y_0)\) to \((x_1, y_1)\):

\[
x(t) = x_0 + t(x_1 - x_0) \\
y(t) = y_0 + t(y_1 - y_0)
\]

\(0 \leq t \leq 1\)

For a LINE: \(-\infty < t < \infty\)

Ex. 4: Parameterize the line segment from (3, 6) to (−2, 5).
Ex. 5: Express the curve by an equation in $x$ and $y$; then sketch the curve. 

$$x(t) = 3t - 1 \quad y(t) = 5 - 2t \quad t \in (-\infty, \infty)$$
Ex. 6: Express the curve by an equation in $x$ and $y$

\[
x(t) = 3\tan t \quad y(t) = 5 - \sec^2 t
\]

Ex. 7: Express the curve by an equation in $x$ and $y$

\[
x(t) = 4 + e^t \quad y(t) = 2e^{2t}
\]
8. The parametric curve given by \((2\cos(t), 2\sin(t))\) is a(n)
9. The parametric curve given by \((3\cos(t), 5\sin(t))\) is a(n)
10. Eliminate the parameter and find a corresponding rectangular equation: \( x = 3t^2 \) and \( y = 2t + 1 \)