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Calculus 1432
Quiz 8
March 7, 2014

1. Give a parameterization for the line segment from (3, 6) to (– 5, 1) for $0 \le t \le 1$.
2 pts

(x_0, y_0) (x_1, y_1)

Formula: $x(t) = x_0 + t(x_1 - x_0)$, $y(t) = y_0 + t(y_1 - y_0)$ $\Rightarrow$ $x(t) = 3 + t(-5-3) = 3 - 8t$, $y(t) = 6 + t(1-6) = 6 - 5t$ $\quad 0 \le t \le 1$

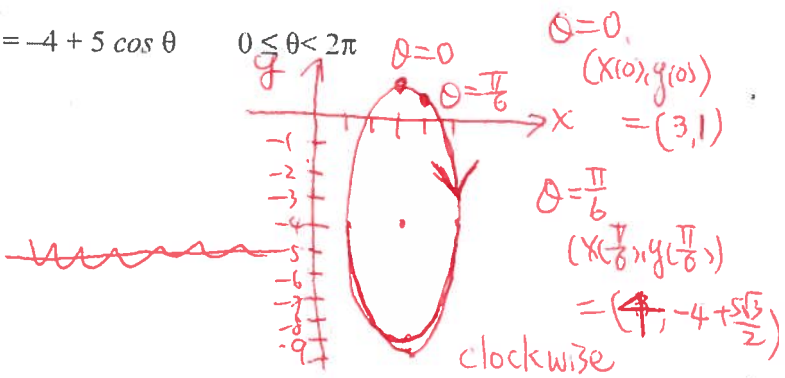
2. Eliminate the parameter and write as an equation of x and y. Then sketch the curve and show orientation.
2 pts

$x = 3 + 2\sin\theta, \quad y = -4 + 5\cos\theta \qquad 0 \le \theta < 2\pi$

Using $\sin^2\theta + \cos^2\theta = 1$

$\Rightarrow \frac{x-3}{2} = \sin\theta, \quad \frac{y+4}{5} = \cos\theta$

$\Rightarrow \left(\frac{x-3}{2}\right)^2 + \left(\frac{y+4}{5}\right)^2 = 1$

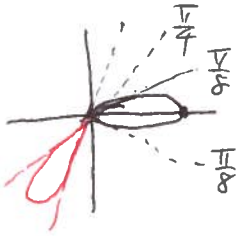


3. Find a formula for the area inside one petal of the flower given by $r = 2\cos(4\theta)$. Do not integrate.
3 pts

Formula: $A = \int_a^b \frac{1}{2}(\rho(\theta))^2 d\theta$.

$\Rightarrow$ 8 petals

$r = 2\cos(4\theta)$ goes through: $[r, \theta] = [2, 0], [0, \frac{\pi}{8}], [0, -\frac{\pi}{8}]$

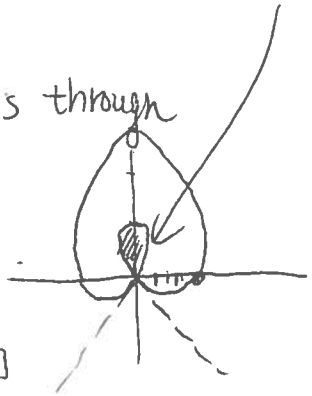


$\Rightarrow A = \frac{1}{2}\int_{-\frac{\pi}{8}}^{\frac{\pi}{8}} [2\cos(4\theta)]^2 d\theta$

4. Find a formula for the area inside the inner loop of the limacon given by $r = 3 + 6\sin(\theta)$. Do not integrate.
3 pts

$r = 3 + 6\sin\theta$ goes through

$[r, \theta]$: $[3, 0]$, $[9, \frac{\pi}{2}]$, $[3, \pi]$, $[-3, \frac{3\pi}{2}]$, $[3, 2\pi]$



$[0, \theta_1]$, $[0, \theta_2]$

$0 = 3 + 6\sin\theta$

$\Rightarrow \sin\theta = -\frac{1}{2} \Rightarrow \theta = \frac{7\pi}{6}$ or $\frac{11\pi}{6}$

$A = \int_{\frac{7\pi}{6}}^{\frac{11\pi}{6}} \frac{1}{2}(3 + 6\sin\theta)^2 d\theta$.