

MAT 137 (Calculus II) Prof. Swift

Worksheet on Parametric Curves and Arc Length

For problems 1 and 2, a particle moves in the plane with position $x = 3 \cos(t)$ and $y = 2 \sin(t)$.

1. Find the speed of the particle at time t . Denote the speed as $v(t)$, following the physics convention even though the speed is the *magnitude* of the velocity.
2. Write a definite integral for the distance traveled by the particle in the time interval $0 \leq t \leq 2\pi$. Note that this is also the perimeter of an ellipse. Can you evaluate the integral by finding an antiderivative?
3. The top two figures show the graphs of $x = f(t)$ and $y = g(t)$. On the bottom figure, sketch the parametric curve traced out for $0 \leq t \leq 3$ in the $x - y$ plane.

