

Math Sheet

Name _____ Score _____ Teacher _____ Date _____

Parametric Calculus

Show derivatives with respect to t before forming dy/dx . Check dx/dt and dy/dt when classifying tangents, and preserve every stated traversal interval.

1. For $x = 4 \cos(t)$, $y = 4 \sin(t)$, find d^2y/dx^2 where $\sin(t) \neq 0$.

2. For $x = 3t + 2$, $y = t^2 + 3t$, find dy/dx and the tangent line at $t = 3$.

Parametric Calculus

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3. For the parametric curve shown by $x = 6 \cos(t)$, $y = 6 \sin(t)$, $0 \leq t \leq 2\pi$, make a value table and sketch the traced curve with arrows for increasing t.

t	0	π	2π
(x,y)			



4. Find horizontal and vertical tangents for $x = t^2 + 0$, $y = t^3 - 108t$. Verify the companion derivative is nonzero.

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5. The arc $x = t$, $y = 21(1 - t^2)$, $-1 \leq t \leq 1$, is traversed left to right and closed by the x -axis. Find the enclosed area with correct bounds and orientation.

6. For $x = 9 \cos(t)$, $y = -9 \sin(t)$, find speed and arc length on $0 \leq t \leq 4\pi/2$.
