DATE: _____

6.2 Anti-differentiation: Vectors/Parametric

Net distance (displacement) over $t = a$ to $t = b$

Position @ $t = a$ = initial position + net distance

A GRAPHING CALCULATOR IS REQUIRED FOR THESE QUESTIONS

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1. A particle moving along a curve in the xy-plane has position $(x(t), y(t))$ at time $t \geq 0$ with $\frac{dx}{dt} = \sqrt{3t}$ and $\frac{dy}{dt} = 3\cos\left(\frac{t^2}{2}\right)$. The particle is at position $(1,5)$ at time $t = 4$. Find position vector of the particle at time $t = 0$.

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2. A particle moving along a curve in the xy-plane has position $(x(t), y(t))$ at time $t \geq 0$ with $\frac{dx}{dt} = 3 + \cos(t^2)$. The derivative $\frac{dy}{dt}$ is not explicitly given. At time $t = 2$, the object is at position $(1,8)$. At time $t = 2$, the value of $\frac{dy}{dt}$ is -7. Write an equation for the line tangent to the curve at the point $(x(2), y(2))$.

NO CALCULATOR IS ALLOWED FOR THESE QUESTIONS

3. A particle moves in the xy-plane in such as way that its velocity vector is $\langle 1 + t, t^3 \rangle$. If the position vector at $t = 0$ is $\langle 5,0 \rangle$, find the position of the particle at $t = 2$.

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4. Point $P(x, y)$ moves in the xy-plane in such as way that $\frac{dx}{dt} = \frac{1}{t+1}$ and $\frac{dy}{dt} = 2t$ for $t \geq 0$. Find the coordinates of P in terms of t given that, when $t = 1$, $x = ln2$ and $y = 0$.