

2. A particle moving along a curve in the xy -plane is at position $(x(t), y(t))$ at time $t > 0$. The particle moves in such a way that $\frac{dx}{dt} = \sqrt{1+t^2}$ and $\frac{dy}{dt} = \ln(2+t^2)$. At time $t = 4$, the particle is at the point $(1, 5)$.
- (a) Find the slope of the line tangent to the path of the particle at time $t = 4$.
 - (b) Find the speed of the particle at time $t = 4$, and find the acceleration vector of the particle at time $t = 4$.
 - (c) Find the y -coordinate of the particle's position at time $t = 6$.
 - (d) Find the total distance the particle travels along the curve from time $t = 4$ to time $t = 6$.

Write your responses to this question only on the designated pages in the separate Free Response booklet. Write your solution to each part in the space provided for that part.

END OF PART A

CALCULUS BC
SECTION II, Part B
Time—1 hour
4 Questions

NO CALCULATOR IS ALLOWED FOR THESE QUESTIONS.

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2. At time $t \geq 0$, a particle moving along a curve in the xy -plane has position $(x(t), y(t))$ with velocity vector $v(t) = (\cos(t^2), e^{0.5t})$. At $t = 1$, the particle is at the point $(3, 5)$.
- (a) Find the x -coordinate of the position of the particle at time $t = 2$.
 - (b) For $0 < t < 1$, there is a point on the curve at which the line tangent to the curve has a slope of 2.
At what time is the object at that point?
 - (c) Find the time at which the speed of the particle is 3.
 - (d) Find the total distance traveled by the particle from time $t = 0$ to time $t = 1$.
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END OF PART A OF SECTION II