

Vector derivatives and arc length

1. Let $\mathbf{r}(t) = t^2\mathbf{i} + t^3\mathbf{j}$.

a) Compute, velocity, speed, unit tangent vector and acceleration.

b) Write down the integral for arc length from $t = 1$ to $t = 4$. (*Do not compute the integral.*)

2. Consider the parametric curve

$$x(t) = 3t + 1, \quad y(t) = 4t + 3.$$

a. Compute, velocity, speed, unit tangent vector and acceleration.

b. Compute the arc length of the trajectory from $t = 0$ to $t = 2$.

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