

9. Parametric Equations, Polar Coordinates, and Vector-Valued Functions

Starter Quiz · 课前小测

AP Calculus BC

Name: _____ Score: _____

- For a parametric curve, $\frac{dy}{dx} =$
 - ☐ $\frac{dy/dt}{dx/dt}$
 - ☐ $\frac{dx/dt}{dy/dt}$
 - ☐ $\frac{dy}{dt} \cdot \frac{dx}{dt}$
 - ☐ $\frac{d}{dt} \left[\frac{y}{x} \right]$
- The parametric second derivative $\frac{d^2y}{dx^2}$ equals...
 - ☐ $\frac{d^2y/dt^2}{d^2x/dt^2}$
 - ☐ $\frac{\frac{d}{dt}(dy/dx)}{dx/dt}$
 - ☐ $\frac{dy/dt}{dx/dt}$
 - ☐ $\frac{d^2y}{dt^2}$
- The arc length of a parametric curve is $\int_a^b (\quad) dt$ where the integrand is...
 - ☐ $\sqrt{1 + (dy/dx)^2}$
 - ☐ $\sqrt{(dx/dt)^2 + (dy/dt)^2}$
 - ☐ $(dx/dt) + (dy/dt)$
 - ☐ $\sqrt{(dx/dt)^2 - (dy/dt)^2}$
- To differentiate $\mathbf{r}(t) = \langle x(t), y(t) \rangle$, you...
 - ☐ multiply the components
 - ☐ differentiate each component separately
 - ☐ add the components then differentiate
 - ☐ take the magnitude first
- To integrate $\langle f(t), g(t) \rangle$, you...

- ☐ integrate each component separately
- ☐ multiply the components
- ☐ take the magnitude
- ☐ differentiate instead

- For $\mathbf{v}(t) = \langle 2t, 3 \rangle$, find the speed at $t = 2$.

- For $x = t^2$, $y = t^3$, $\frac{dy}{dx} = \frac{3t}{2}$. Find the slope at $t = 2$.

- The parametric second derivative equals $\frac{d^2y/dt^2}{d^2x/dt^2}$.

☐ True ☐ False

- The parametric arc-length integrand equals the point's _____.

- Integrating a vector function introduces a constant vector $\mathbf{C}$.

☐ True ☐ False

9. Parametric Equations, Polar Coordinates, and Vector-Valued Functions

Answers · 答案

AP Calculus BC

1. $\frac{dy/dt}{dx/dt}$

Top over bottom: $\frac{dy/dt}{dx/dt}$.

2. $\frac{\frac{d}{dt}(dy/dx)}{dx/dt}$

Differentiate $\frac{dy}{dx}$ in t , then divide by $\frac{dx}{dt}$.

3. $\sqrt{(dx/dt)^2 + (dy/dt)^2}$

Both derivatives squared, added, under a root.

4. differentiate each component separately

$$\mathbf{r}' = \langle x', y' \rangle.$$

5. integrate each component separately

Integrate componentwise, plus a constant vector.

6. 5

$$\sqrt{4^2 + 3^2} = 5.$$

7. 3

$$\frac{3(2)}{2} = 3.$$

8. False

That naive ratio is wrong.

9. speed

Integral of speed = distance.

10. True

One constant per component, bundled into $\mathbf{C}$.