

4. Functions Involving Parameters, Vectors, and Matrices

Starter Quiz ·

AP Precalculus

Name: _____ Score: _____

1. A **parametric function** describes a curve using...
 - ☐ two equations $x(t)$ and $y(t)$ driven by a parameter t
 - ☐ a single equation $y = f(x)$
 - ☐ a matrix
 - ☐ only an angle
2. When parametric functions model motion, the parameter t usually represents...
 - ☐ the slope
 - ☐ the area
 - ☐ distance
 - ☐ time
3. For a moving point, $\frac{dx}{dt}$ and $\frac{dy}{dt}$ are the...
 - ☐ horizontal and vertical velocity components
 - ☐ the position coordinates
 - ☐ the parameter values
 - ☐ the total distance travelled
4. An **implicitly defined** relationship is one where...
 - ☐ it uses a parameter t
 - ☐ y is written alone as $y = f(x)$
 - ☐ x and y appear mixed together, not solved for y
 - ☐ there is no y at all
5. The **conic sections** are the curves formed by...
 - ☐ adding two lines
 - ☐ slicing a cone with a plane at different angles
 - ☐ reflecting a parabola
 - ☐ spinning a circle
6. What is the **magnitude** of the vector $\langle 3, 4 \rangle$?

7. A vector-valued function $\vec{r}(t) = \langle x(t), y(t) \rangle$ is closely related to a parametric function.

☐ True ☐ False

8. For $\begin{bmatrix} 3 & 1 \\ 1 & 2 \end{bmatrix}$, the determinant is $3 \cdot 2 - 1 \cdot 1$. What is it?

9. The columns of the matrix tell you where the two basis _____ land.

10. The matrix that stores the rates of movement between states is called the _____ matrix.

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Answers ·

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1. two equations $x(t)$ and $y(t)$ driven by a parameter t

A **parametric function** gives x and y each as a function of a **parameter** t : the pair $(x(t), y(t))$ traces the curve.

2. time

In a **parametric function** modeling motion, t is time, and $(x(t), y(t))$ is the object's position then.

3. horizontal and vertical velocity components

The **rate of change** of each coordinate is a velocity component: dx/dt across, dy/dt up.

4. x and y appear mixed together, not solved for y

An **implicitly defined curve**, like $x^2 + y^2 = 25$, mixes x and y without isolating y .

5. slicing a cone with a plane at different angles

A **conic section** is the intersection of a plane and a cone; the slice angle gives a circle, ellipse, parabola, or hyperbola.

6. 5

Magnitude $= \sqrt{3^2 + 4^2} = \sqrt{25} = 5$ – the length of the arrow, by the Pythagorean theorem.

7. True

They are two views of the same idea: the components $x(t), y(t)$ are exactly the parametric equations.

8. 5

The **determinant** of $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is $ad - bc = 3 \cdot 2 - 1 \cdot 1 = 5$.

9. vectors

Column 1 is where $\langle 1, 0 \rangle$ lands and column 2 is where $\langle 0, 1 \rangle$ lands – that fully describes the transformation.

10. transition

The **transition matrix** holds the fraction moving from each state to each other state.