

Objective 68

Determine if a function is linear or nonlinear

1 OF 2

PROBLEM

Identify each nonlinear function.

$$y = 7x \quad y = \frac{x^2}{7} \quad y = \frac{7}{x}$$

STEP 1

Recall how to determine if a function is linear.

A function is linear if its graph is a line. Any graph of a line will have a constant rate of change.

STEP 2

Make a table of values for $y = 7x$. Determine if the function is linear.

x	1	2	3
y	7	14	21

When x increases from 1 to 2, y increases by $14 - 7 = 7$.

When x increases from 2 to 3, y increases by $21 - 14 = 7$.

This function is linear because y has a constant rate of change.

STEP 3

Make a table of values for $y = \frac{x^2}{7}$. Determine if the function is linear.

x	1	2	3
y	$\frac{1}{7}$	$\frac{4}{7}$	$\frac{9}{7}$

When x increases from 1 to 2, y increases by $\frac{4}{7} - \frac{1}{7} = \frac{3}{7}$.

When x increases from 2 to 3, y increases by $\frac{9}{7} - \frac{4}{7} = \frac{5}{7}$.

The function is not linear because y does not have a constant rate of change.

STEP 4

Make a table of values for $y = \frac{7}{x}$. Determine if the function is linear.

x	1	2	3
y	7	$\frac{7}{2}$	$\frac{7}{3}$

When x increases from 1 to 2, y changes by $\frac{7}{2} - 7 = -\frac{7}{2}$.

When x increases from 2 to 3, y changes by $\frac{7}{3} - \frac{7}{2} = -\frac{7}{6}$.

The function is not linear because y does not have a constant rate of change.

ANSWER

$y = \frac{x^2}{7}$ and $y = \frac{7}{x}$ are nonlinear functions.

Guided Practice:

1. Which function is linear? [A] $y = \frac{3}{5} - \frac{x}{8}$ [B] $y = \frac{3}{x} - \frac{x}{3}$ [C] $y = \frac{1}{x+8}$

2. Circle each linear function.

$y = \frac{3}{x}$ $y = \frac{x+3}{8}$ $y = \frac{7}{9} - \frac{x}{7}$

Independent Practice:

3. Which function is nonlinear? [A] $y = \frac{x+2}{2}$ [B] $y = -7x - 7$ [C] $y = \frac{2}{x+2}$

4. Circle each nonlinear function.

$y = 7x$ $y = \frac{7}{x}$ $y = \frac{x^3}{7}$