

3.2 Linear Functions

linear equation in two variables: an equation that can be written in the form $y = mx + b$; the graph of a linear equation is a line (no curves or bends)

linear function: a function whose graph is a non-vertical line

nonlinear function: a function whose graph is not a line

solution of a linear equation in two variables: an ordered pair (x, y) that makes the equation true

Representations of Functions

Equation	Mapping Diagram	Graph	Input-Output Table										
$y = x + 3$	<p>Input, x Output, y</p>		<table border="1"> <thead> <tr> <th>Input, x</th> <th>Output, y</th> </tr> </thead> <tbody> <tr> <td>-1</td> <td>2</td> </tr> <tr> <td>0</td> <td>3</td> </tr> <tr> <td>1</td> <td>4</td> </tr> <tr> <td>2</td> <td>5</td> </tr> </tbody> </table>	Input, x	Output, y	-1	2	0	3	1	4	2	5
Input, x	Output, y												
-1	2												
0	3												
1	4												
2	5												

Determine whether the graph represents a *linear* or *nonlinear* function. Explain.

<p>1.</p> <p>Non-linear (has a curve)</p>	<p>2.</p> <p>Linear (straight line)</p>
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Determine whether the table represents a *linear* or *nonlinear* function. Explain.

<p>3.</p> <table border="1"> <tr> <td></td> <td></td> <td>+1</td> <td>+1</td> <td>+1</td> <td></td> </tr> <tr> <td>x</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td></td> </tr> <tr> <td>y</td> <td>-1</td> <td>2</td> <td>5</td> <td>8</td> <td></td> </tr> <tr> <td></td> <td></td> <td>+3</td> <td>+3</td> <td>+3</td> <td></td> </tr> </table> <p>Linear; has a consistent rate of change</p>			+1	+1	+1		x	1	2	3	4		y	-1	2	5	8				+3	+3	+3		<p>4.</p> <table border="1"> <tr> <td></td> <td></td> <td>+1</td> <td>+1</td> <td>+1</td> <td></td> </tr> <tr> <td>x</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> <td></td> </tr> <tr> <td>y</td> <td>0</td> <td>-1</td> <td>0</td> <td>3</td> <td></td> </tr> <tr> <td></td> <td></td> <td>-1</td> <td>+1</td> <td>+2</td> <td></td> </tr> </table> <p>Non-linear; inconsistent rate of change</p>			+1	+1	+1		x	-1	0	1	2		y	0	-1	0	3				-1	+1	+2	
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		-1	+1	+2																																													

Determine whether the equation represents a linear or nonlinear function. Explain.

5. $y = 3 - 2x$

$y = -2x + 3$

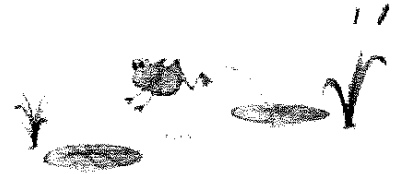
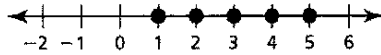
Linear; $m = -2, b = 3$

6. $y = -\frac{3}{4}x^3$

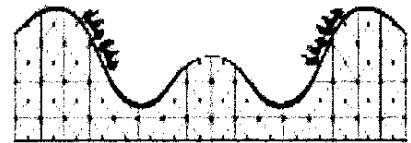
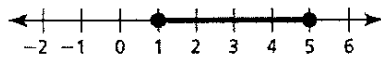
Nonlinear; has an x^3

Discrete and Continuous Domains:

discrete domain

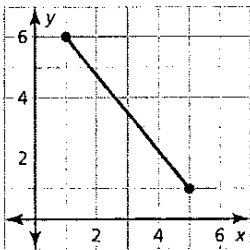


continuous domain



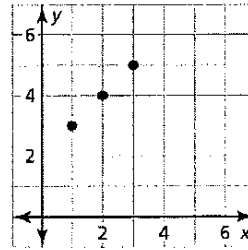
Find the domain of the function represented by the graph. Determine whether the domain is discrete or continuous. Explain.

7.



Continuous
 $D = \{x \mid -1 \leq x \leq 5\}$

8.



Discrete
 $D = \{x \mid x = 1, 2, 3\}$

x	y
1	3
2	4
3	5