

SC Algebra 1
3.3 Linearity and Continuity

Warm Up:

Determine whether each function is linear or non-linear.

1.	Width of Lot (ft)	80	100	120	140	160
	Area of Lot (sq ft)	4800	7000	9600	12,600	16,000

2.	Deliveries	6	7	8	9	10
	Hours Worked	8	8	8	8	8

3.	Length	2.5	3.75	5	6.25	7.5
	Width	1	1.5	2	2.5	3

4.	Population (millions)	0.5	1.0	2.8	3.3	3.8	13.2	18.1	30.4
	Auto Registrations (millions)	0.5	1.1	2.6	2.6	2.8	10.9	10.2	21.9

5.	Average Speed (mph)	30	44	50	43	35	65	60	55
	Fuel Efficiency (mpg)	35	30	29	32	34	25	26	29

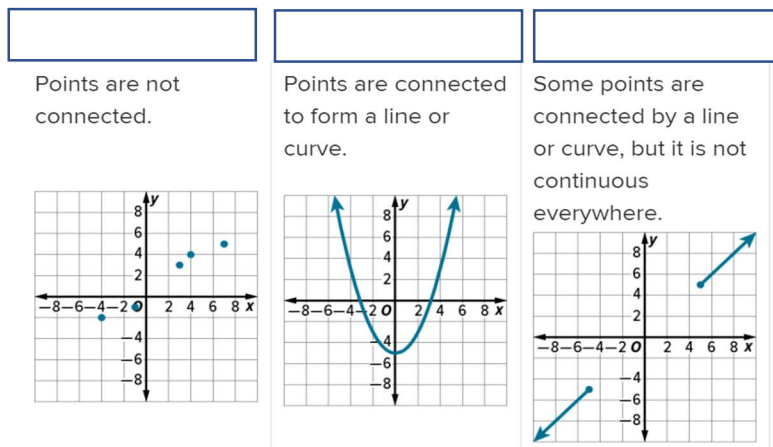
Speak Like A Mathematician:

discrete function: a function in which the points on the graph are _____.

continuous function: a function that can be graphed with a _____ or a smooth _____.

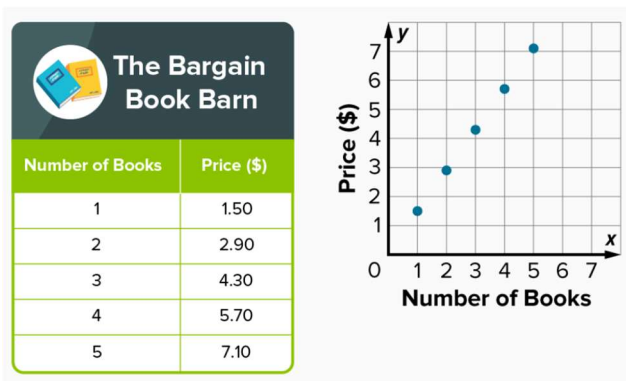
linear function: a function that's graph forms a _____.

non-linear function: a function in which the set of points cannot all lie on one _____.



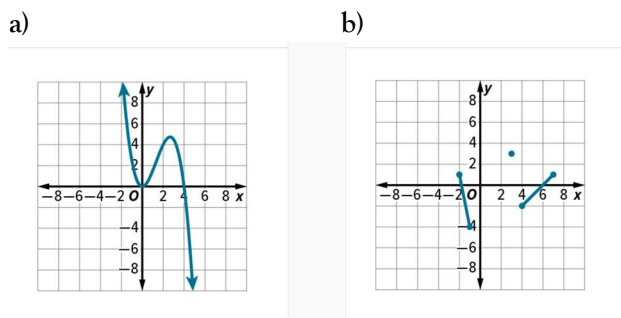
Example 1: Determine Continuity

The Bargain Book Barn sells young adult novels on a sliding scale. That is, the more books you buy, the cheaper they are. Let $f(x)$ model the stores prices for given quantities. Is $f(x)$ discrete or continuous? Explain your reasoning.



Example 2: Determine Continuity by Using Graphs

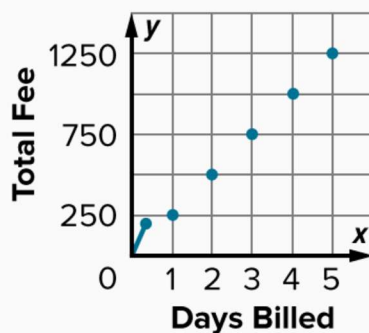
Determine whether $f(x)$ and $g(x)$ are continuous, discrete, or neither. Explain your reasoning. Also, give the domain and range.



Example 3:

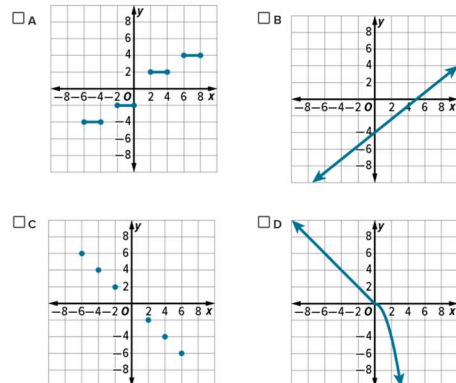
Apply Discrete and Continuous Functions

DETECTIVE As a private investigator, Tia charges \$25 per hour for any amount of time up to eight hours and then a flat rate of \$250 per day. Use the graph to determine if the function that models this situation is *discrete*, *continuous*, or *neither*.



Determine Continuity by Using Graphs

Which functions are continuous? Select all that apply.



Example 4: Identify Linear and Nonlinear Functions

- Determine whether $y = 4x^2 - (2x)^2 + 3x - 5$ is a linear or nonlinear function.
- Determine whether $3x^2 - \sqrt{9}x^2 - y = 17$ is a linear or nonlinear function.

Example 5: Identify Linear and Nonlinear Functions

- Determine whether $y = 3x^3 - x^2 + 3x + 6$ is a linear or nonlinear function.
- Determine whether $4x - (2y)^2 = 3$ is a linear or nonlinear function.

Standard Form on a Linear Function:
 $ax + by = c$