

Unit 2 - Functions

Feb 22/
2012

Functions, Domain, and Range

A relation is any set of ordered pairs (x, y) relating an independent variable (typically x) to a dependent variable (typically y).

For example: $\{(0, 1), (3, 4), (2, -5)\}$ is a set of ordered pairs.

Terminology:

$\{ \}$ enclose elements of a set

$,$ separates elements within the brackets

\mathbb{R} \mathbb{R} means real numbers

\mathbb{Z} \mathbb{Z} means integers

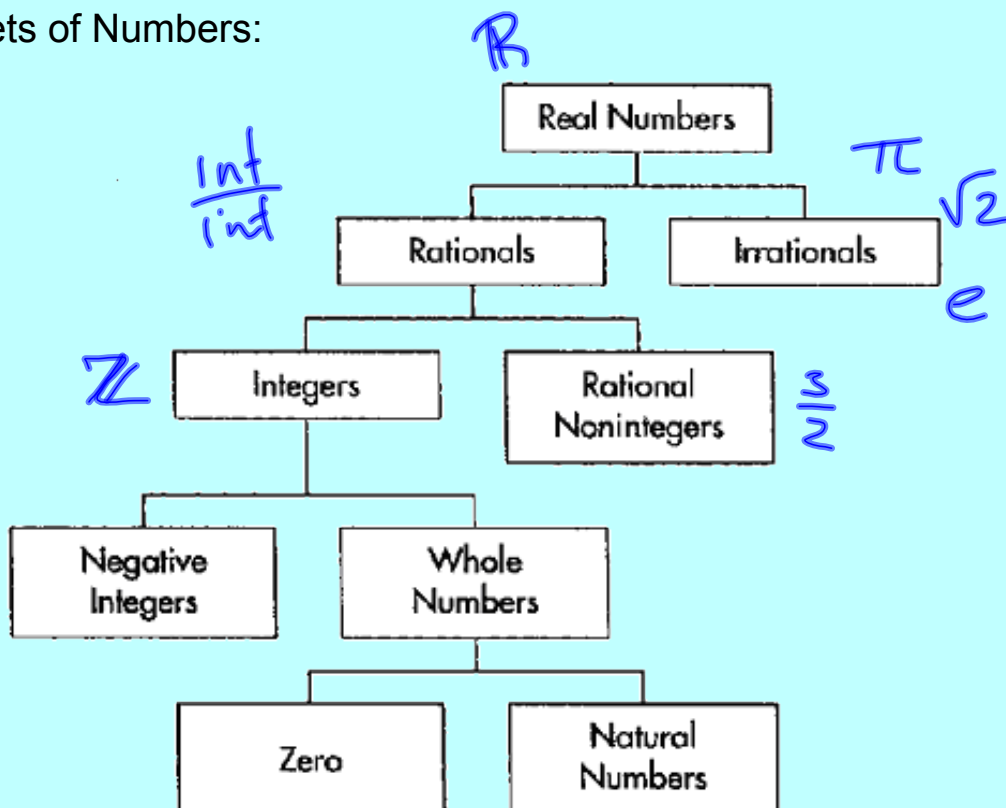
\in \in means "an element of"

Domain is the set of all possible values for the independent variable.

Range is the set of all possible values for the dependent variable.

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Sets of Numbers:



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Domain is the set of all possible values for the independent variable. (x)

Range is the set of all possible values for the dependent variable. (y)

Ex.1 State the domain and range for
 $\{(0, 1), (3, 4), (2, -5)\}$

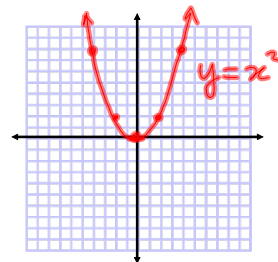
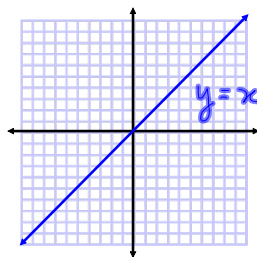
$$D = \{0, 2, 3\}$$

$$R = \{1, 4, -5\}$$

* order does
not
matter

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Ex.2 State the domain and range for each graph:
 (a) $y = x$ (b) $y = x^2$



$$D = \{x \mid x \in \mathbb{R}\}$$

"set of all x such that x is real"

$$R = \{y \mid y \in \mathbb{R}\}$$

$$D = \{x \mid x \in \mathbb{R}\}$$

$$R = \{y \mid y \in \mathbb{R}, y \geq 0\}$$

"greater than
or
equal to"

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A function is a special type of relation where each value of x yields only a single value of y .

Many mathematical techniques can only be applied to functions, so it is important to be able to determine if a relation is a function.

Ex.3 State the domain and range, and determine which are functions.

(a) $\{(1,2), (3,1), (4,2), (7,2)\}$

$$D = \{1, 3, 4, 7\}$$

$$R = \{2, 1\}$$

is a function
each value of x
has one value
of y

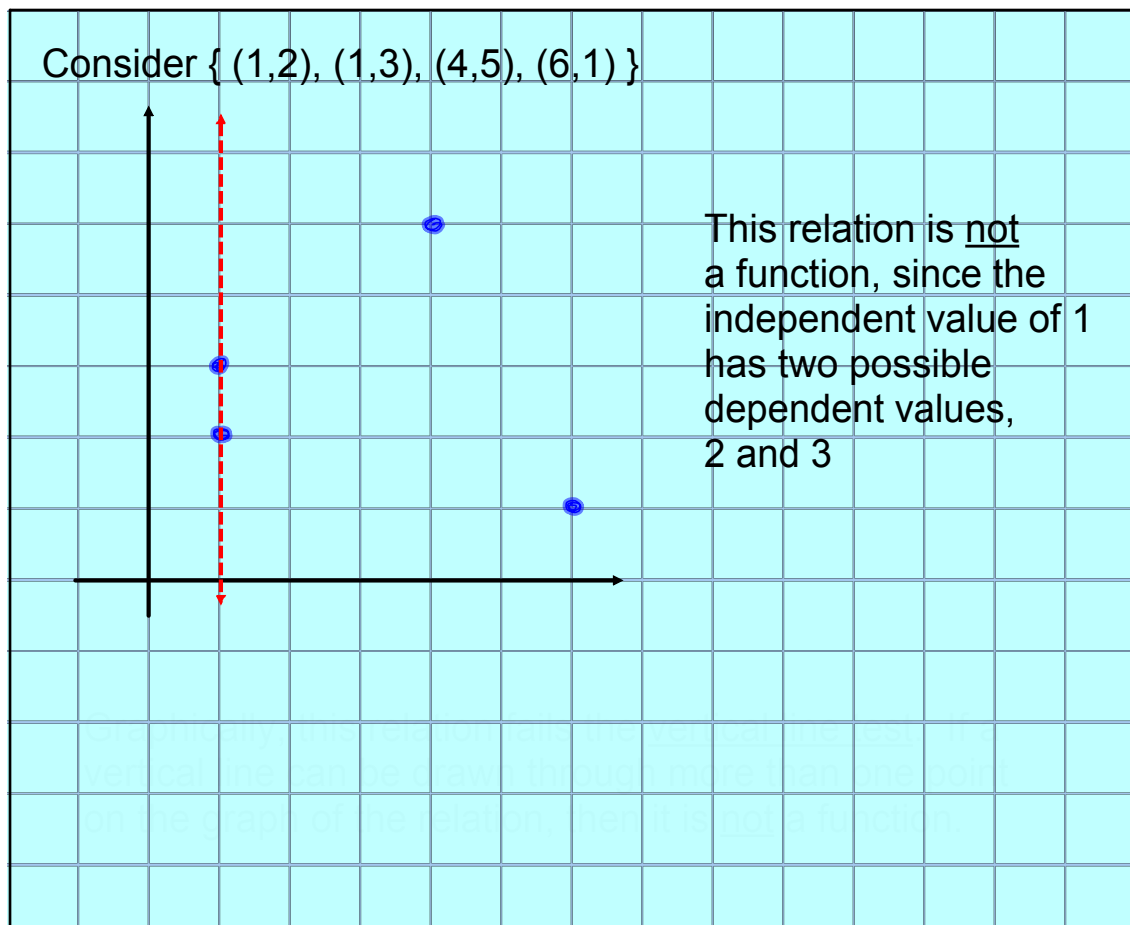
(b) $\{(1,2), (1,3), (4,5), (6,1)\}$

$$D = \{1, 4, 6\}$$

$$R = \{2, 3, 5, 1\}$$

$x=1$ gives
 $y=2$ or $y=3$
not a function

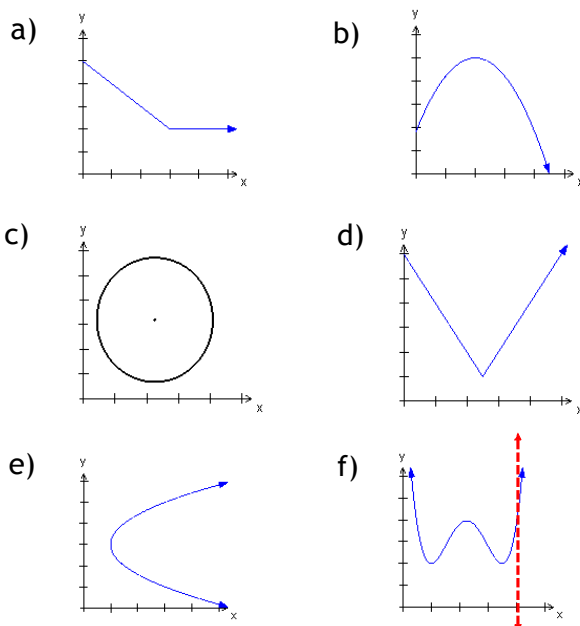
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If any vertical line passes through more than one point on the graph of a relation, it is not a function. This is known as the vertical line test.

Ex.4 Which graphs are functions?



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The equation of a relation which is a function can be written using a special notation, **function notation**.

x-y notation

$$y = 3x + 2$$

sub $x = 1$

$$y = 3(1) + 2 \\ = 5$$

function notation

$$f(x) = 3x + 2$$

$$f(1) = 3(1) + 2 \\ = 5$$

Ex.5 If $f(x) = 3x + 2$, evaluate:

a) $f(5)$

b) $f(-1)$

c) $f(2/3)$

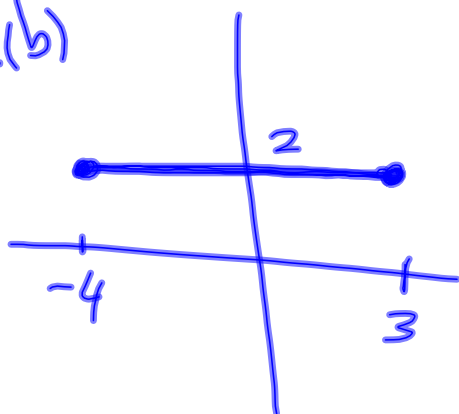
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Assigned Work:

p.178 # 1 - 3, 5, ~~(6 - 10)(ad)~~, 15, ~~18~~

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3.(b)

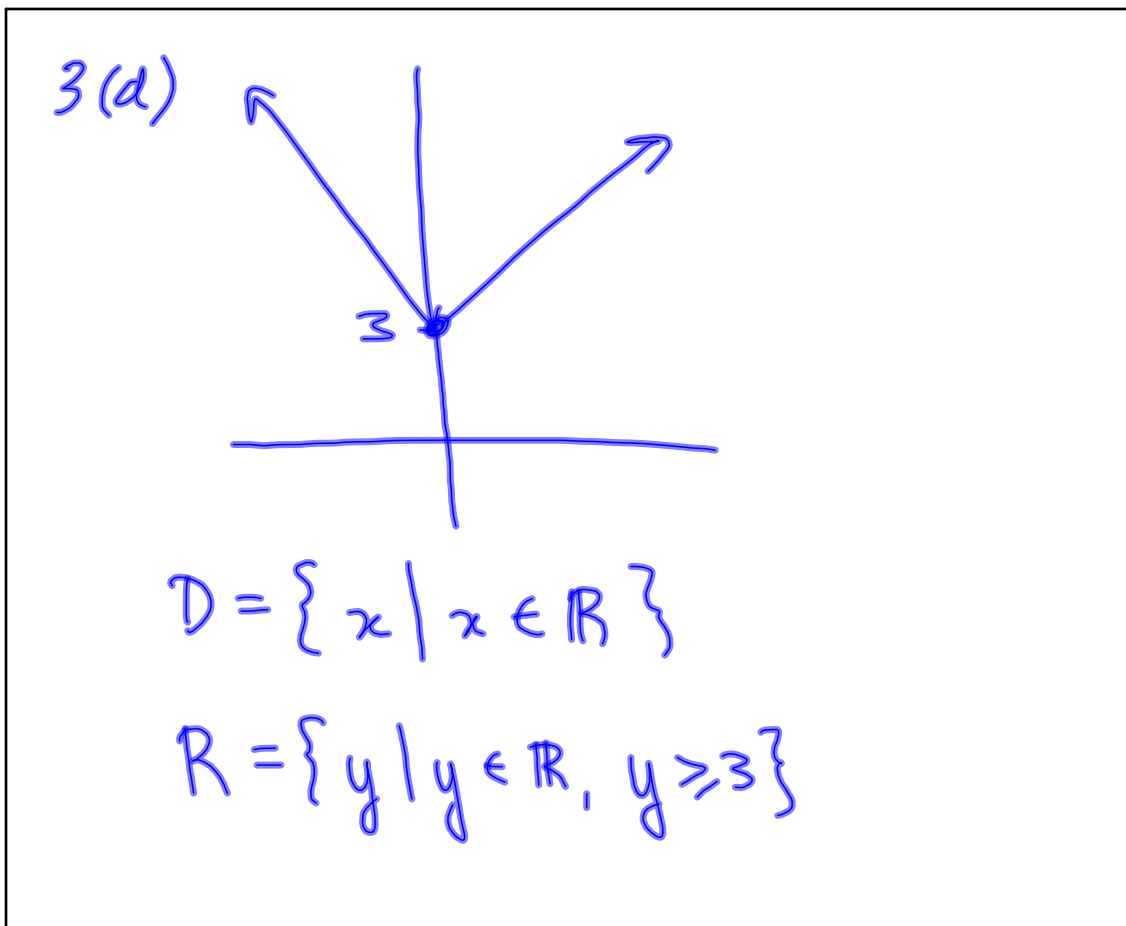


$$D = \{x \mid x \in \mathbb{R}, x \geq -4, x \leq 3\}$$

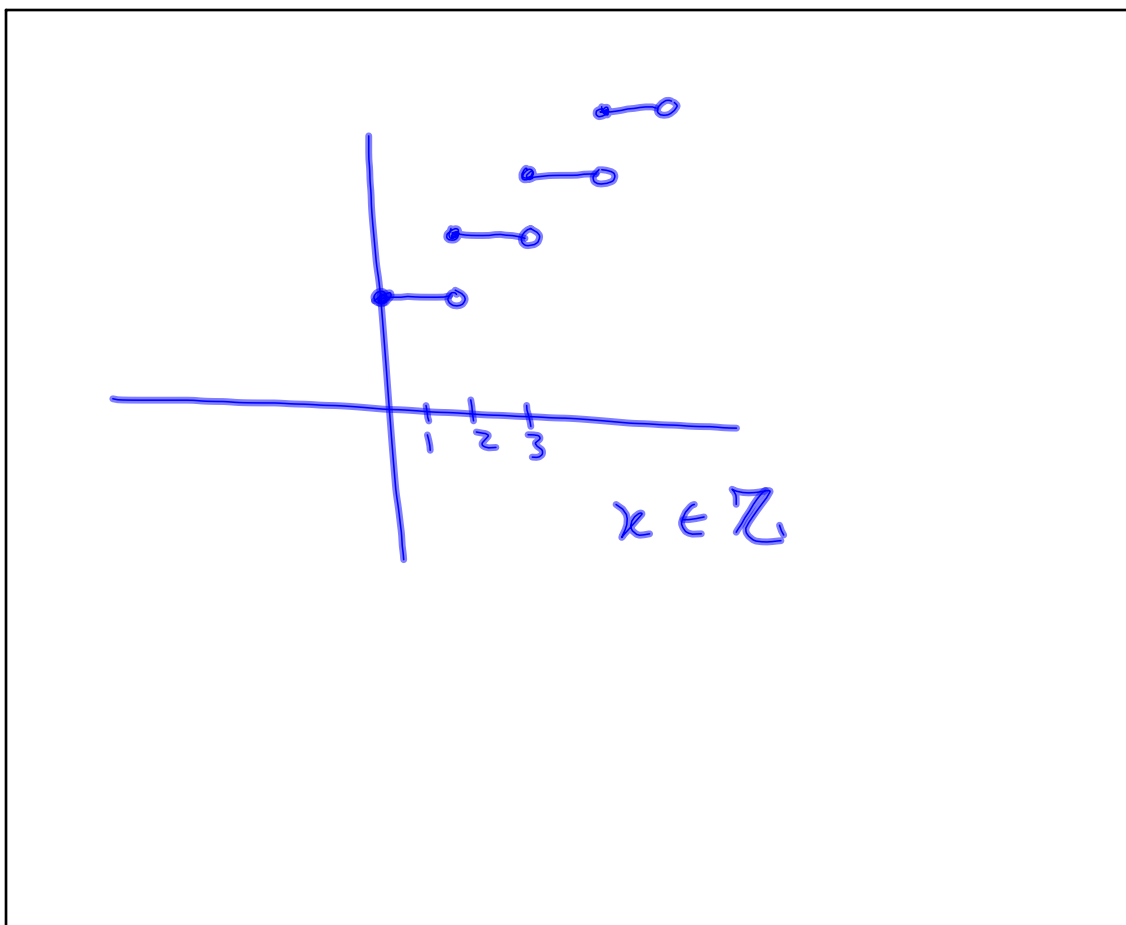
$$-4 \leq x \leq 3$$

$$R = \{2\}$$

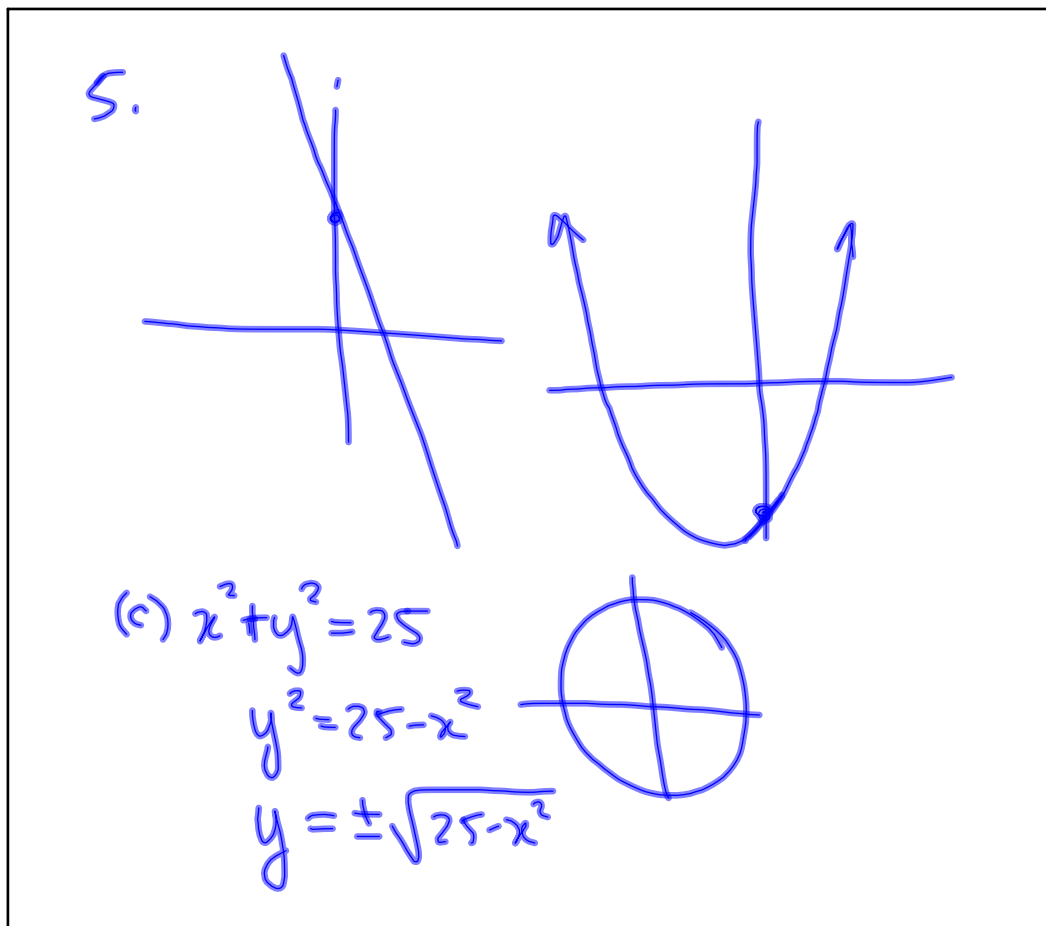
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15. t for 100 km D

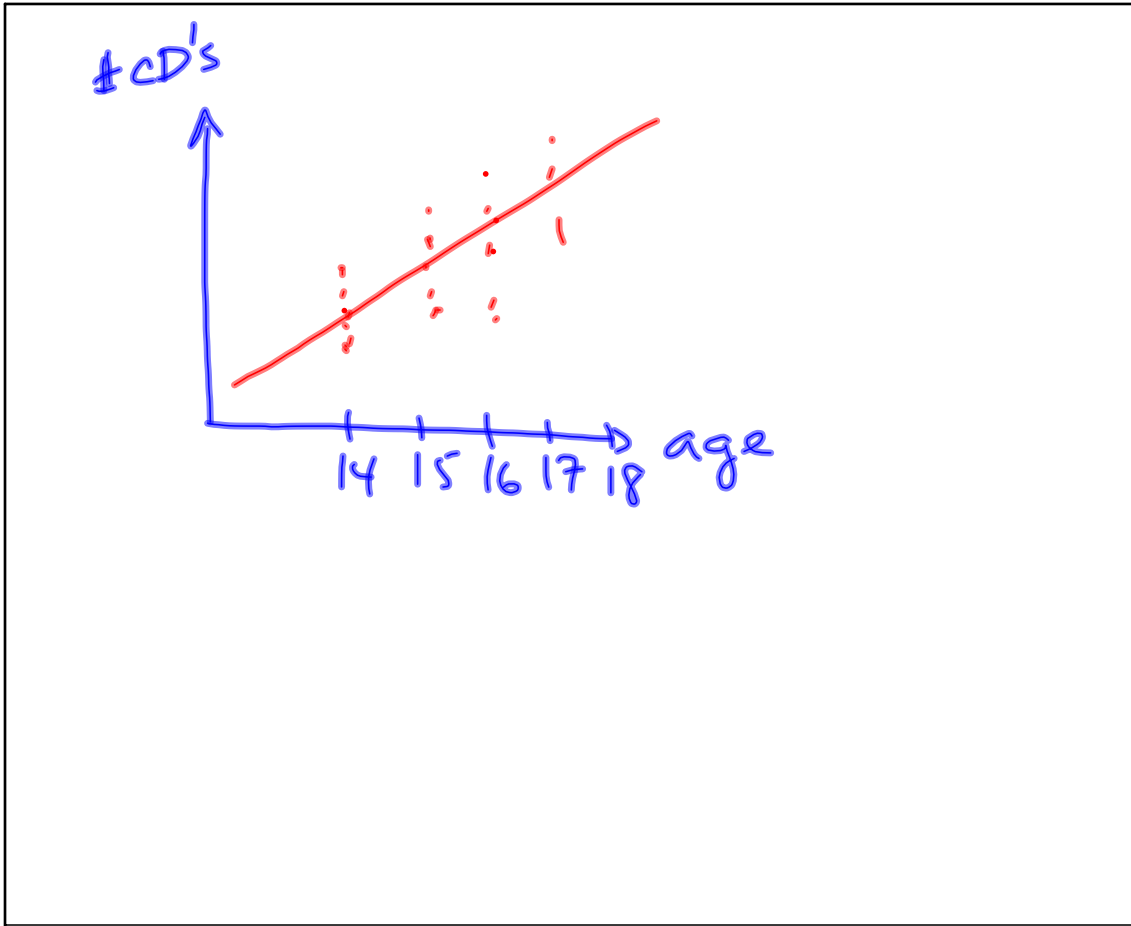
v speed of car. I

$$d = vt$$

$$t = \frac{100}{v} \rightarrow \text{is a function}$$

(1 value of v \rightarrow 1 value of t)

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