

Some sample problems from 12.1

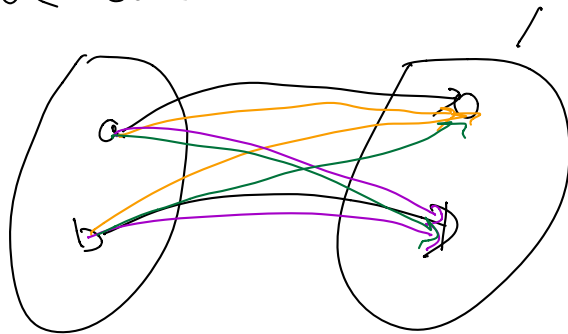
Problem 3: there are four different functions from $\{a, b\}$ to $\{0, 1\}$. List them.

Relation on $\{a, b\} \times \{0, 1\}$ is any subset of this Cartesian product.

$$R \subseteq \{(a, 0), (a, 1), (b, 0), (b, 1)\}.$$

$$|\mathcal{P}(\{(a, 0), (a, 1), (b, 0), (b, 1)\})| = 16$$

There are 16 relations



one example function

two choices for $f(a)$
two choices for $f(b)$

4 choices.

a	0	b	0
a	1	b	0
a	0	b	1
a	1	b	1

Problem 5: give an example of a relation from $\{a, b, c, d, e\}$ to $\{d, e\}$ that is not a function.

$$R = \{(\underline{a}, d), (\overset{\uparrow}{\underline{a}}, e)\}$$

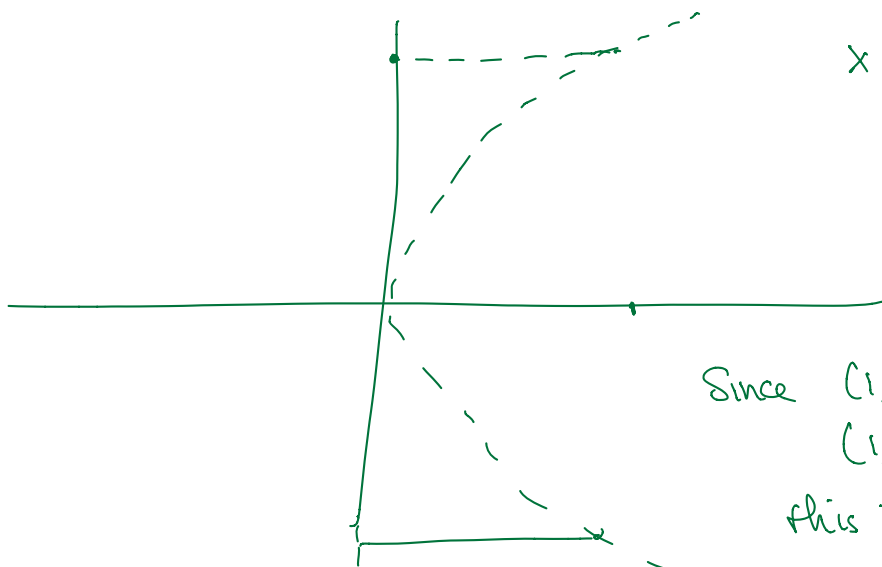
Problem 9. Consider the set $\{(x^2, x) : x \in \mathbb{R}\}$. Is this a function from $\mathbb{R} \rightarrow \mathbb{R}$?

$$\{(x^2, x)\} \subseteq \mathbb{R} \times \mathbb{R}$$

$$x = y^2$$

$$x = -1$$

$$\begin{array}{l} (1, -1) \in f \\ (-1, 1) \in f \end{array}$$



Since $(1, -1) \in f$ and $(1, 1) \in f$,

this is NOT
a function.