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Exercise 6.1

Exercise 6.2

(a)

(b)

(c)

(d)

Exercise 6.3

Let $f\colon \mathbb{R}_{\geq 0} \to \mathbb{R}_{\geq 0}\colon f(x) = \sqrt{x}$ and $g\colon \mathbb{R} \to \mathbb{R}\colon g(x) = x^2$. We have that g(x) is not injective as it was shown in the lecture. The composition $g \circ f = g(f(x)) \ = (\sqrt{x})^2 = x$ is injective, since we have that for all $x, y \in \mathbb{R}_{\geq 0}$ with $x \neq y$ that $f(x) = x \neq y = f(y)$.

Exercise 6.4

Exercise 6.5

I solved (b) and (c) with a python script which is in the appendix.

(a) Since A and D, B and C are switched, we have that $C = \{A \to D, B \to C, C \to B, D \to A, E \ \to E\}$. Therefore $P \circ C = \{A \to 4, B \to 3, C \to 2, D \to 1, E \ \to 5\}$.

(b) $R_1 = \{1 \to 1, 2 \to 3, 3 \ \to 4, 4 \to 5, 5 \to 2\}$

(c) The encoding of ED is EC.