

Musa Al'Khwarizmi

CS 3141: Prof. Kamil's Algorithm Analysis

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Minimal Complete Document

Question 1. Write down sets in order of containment.

We pretend that equivalence classes are just numbers.

$$\mathbb{C} \supset \mathbb{R} \supset \mathbb{Q} \supset \mathbb{Z} \supset \mathbb{N} \supset \mathbb{P} \not\supset (\mathbb{F}_7 = \mathbb{Z}/7\mathbb{Z}) \supset \{\emptyset\}$$

Question 2. Give an example element of $\mathcal{O}(n)$.

Take $11n \in \mathcal{O}(n)$.

Question 3. Find roots of $x^2 - 8x = 9$.

We proceed by factoring,

$$x^2 - 8x - 9 = 9 - 9 \quad \text{Subtract 9 on both sides.}$$

$$x^2 - x + 9x - 9 = 0 \quad \text{Breaking the middle term.}$$

$$x(x - 1) + 9(x - 1) = 0 \quad \text{Pulling out common factors.}$$

$$(x - 1)(x + 9) = 0 \quad \text{Pulling out common } (x - 1).$$

$$x \in \{1, -9\} \quad f(x)g(x) = 0 \Rightarrow f(x) = 0 \vee g(x) = 0.$$

Question 4. Show $P \stackrel{?}{=} NP$.

Let P be zero... Sorry.

BAYT EL-HIKMAH