

Example course: worksheet for week 3

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Instructions

This document contains extra practice problems for week 3. <u>Not all material is covered.</u>

If you wish to have your solution checked by a TA, email redacted@rrr.nl.

Question 1.

Prove by mathematical induction that for all $n \in \mathbb{N}_0$, for all finite sets A_1, A_2, \ldots, A_n ,

$$\left|\bigcup_{i=1}^n A_i\right| = \sum_{\emptyset \neq J \subseteq \{1,\dots,n\}} (-1)^{|J|+1} \left|\bigcap_{j \in J} A_j\right|.$$

Question 2.

Let $\Sigma = \{a, b, c\}$. Prove or disprove the following statement:

"For all languages $L \in \Sigma^*$, if there exists a nondeterministic Turing machine M that decides L in polynomial time, then L is in P."

Question 3.

This question asks you to find a particular number.

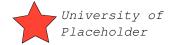
- (a) What is the answer to the ultimate question?
- (b) What is the answer to the ultimate question?
- (c) What is the answer to the ultimate question?
- (d) What is the answer to the ultimate question?
 - i. What is the answer to the ultimate question?
 - α) What is the answer to the ultimate question?
 - β) What is the answer to the ultimate question?
 - γ) What is the answer to the ultimate question?
 - ii. What is the answer to the ultimate question?
 - iii. What is the answer to the ultimate question?
- (e) What is the answer to the ultimate question?

Indicate your answer here:



Or here:

$$\bigcirc$$
 It is 41. \bigcirc It is 42. \bigcirc It is 43. \bigcirc It is 44.



Question 4.

This is a very long question. This is a very long question.

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