

Lassonde School of Engineering

Dept. of EECS

Professor G. Tournakis

EECS 1028E. Problem Set No3

Posted: Oct. 29, 2024

Due: Nov. 18, 2024; by 6:00pm, **in eClass.**

Q: How do I submit?

A:

- (1) Submission must be a **SINGLE** *standalone* file to eClass. Submission by email is not accepted.
- (2) Accepted File Types: PNG, JPEG, PDF, RTF, MS WORD, OPEN OFFICE, ZIP
- (3) Deadline is strict, electronically limited.
- (4) MAXIMUM file size = 10MB



It is worth remembering (from the course outline):

The homework **must** be each individual's own work. While consultations with the instructor, tutor, and among students, are part of the learning process and are encouraged, **nevertheless**, *at the end of all this consultation* each student will have to produce an individual report rather than a *copy* (full or partial) of somebody else's report.

The concept of "late assignments" does not exist in this course, as you recall.



1. (4 MARKS) Show that if $\mathbb{F}$ is a function and $\text{dom}(\mathbb{F})$ is a set then $\mathbb{F}$ is a set.
2. (3 MARKS) **True or False and WHY?** (without the correct “WHY” this maxes out to 0 (zero) Marks). If $\mathbb{P}$ is a function and $\text{ran}(\mathbb{P})$ is a set, IS then $\mathbb{P}$ a set?
3. (3 MARKS) Prove that if $f : A \rightarrow B$ is a 1-1 correspondence, then so is $f^{-1} : B \rightarrow A$.
Hint. You must prove four things about the relation f^{-1} .
4. (6 MARKS) Let $f : A \rightarrow B$ have g and h as *left* inverse and *right* inverse respectively.
Prove
 - (a) $g = h = f^{-1}$.
 - (b) f is a 1-1 correspondence.
5. (3 MARKS) Suppose that each of A_x is a nonempty set for each $x \in \mathbb{R}$ (the reals). Prove that the family of sets $\{A_x : x \in \mathbb{R}\}$ is a set itself. What Principle, if any, did you use, and exactly how?
6. (2 MARKS) Express $\mathbb{V}$ as $\{x : P(x)\}$ for an appropriate property P .
7. (3 MARKS) Prove that if $f : \mathbb{N} \rightarrow B$ is onto, then for some $S \subseteq \mathbb{N}$ we have $S \sim B$.