

This page must be submitted as the first page of your MidTerm-paper answer pages.

**York University
Department of Electrical Engineering and Computer Science
Lassonde School of Engineering**

**EECS 1028M. MID TERM, March 9, 2022; 13:30(pm) – 14:30(pm)
Professor George Tourlakis**

By putting my name and student ID on this MID TERM page, I attest to the fact that my answers included here and submitted by Moodle are my own work, and that I have acted with integrity, abiding by the Senate Policy on Academic Honesty that the instructor discussed at the beginning of the course and linked the full Policy to the Course Outline.

Student NAME (Clearly): _____

Student NUMBER (Clearly): _____

DATE (Clearly): _____

README FIRST! INSTRUCTIONS:

1. Please read ALL these instructions carefully before you start writing.
2. This is a **TIME-LIMITED ON LINE MID TERM**. You have **60 MIN** to answer the MidTerm questions. **ABSOLUTELY last opportunity to upload is BY 14:45 (pm)** —that is 15min **MAX** extra time is allocated to upload your answers to *eClass*.
3. **Only ONE file —size no more than 10MB— can be uploaded per student.**
4. If you submit photographed copy **it still must be ONE file that you submit**. Either **ZIP the PNG or JPEG images OR import them in MS Word and submit ONE Word file** with the photos attached.
5. Using the time allotted for the uploading mechanisms (15 min) for the MidTerm-**answering** part is at your own *risk*. **MidTerm not uploaded on time = MidTerm not written.**
6. Please write your answers by hand —see also 3. above— **as you normally do for assignments** or use a word processor that can convert to PDF. **MS Word is acceptable to upload as is** (without conversion to PDF).

Question	MAX POINTS	MARK
1	7	
2	5	
3	5	
4	6	
TOTAL	23	

- Question 1.** (a) (2 MARKS) Define *Correctly* “ \mathbb{P} is an order”.
- (b) (2 MARKS) State *Correctly* **Principle 0** and **Principle 1** of set formation by stages.
- (c) (3 MARKS) Using said principles (state **exactly** which one was used **where**) prove that for any sets A, B the following statement is **false**.

$$A \in B \in A$$

- Question 2.** (5 Marks) Prove that if $A \cup B = A$ is true, then $A \cap B = B$ is also true, **AND CONVERSELY**.

Caution. There are two directions to prove.

- Question 3.** (5 Marks) If \mathbb{F} is a function and $\text{dom}(\mathbb{F})$ is a set, then \mathbb{F} is a set.

Hint. Prove first that $\text{ran}(\mathbb{F})$ is a set.

- Question 4.** Consider the functions $f : A \rightarrow B$, $g : B \rightarrow A$ and $h : B \rightarrow A$ such that if $gf = \mathbf{1}_A$ and $fh = \mathbf{1}_B$.

Prove

- (a) (3 MARKS) f is a 1-1 correspondence $A \sim B$.
- (b) (3 MARKS) $f\mathbf{1}_A = f$ and $\mathbf{1}_B f = f$.