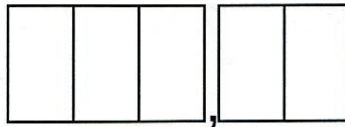


NOM POUPA

Prénom Adrien

Promo M1 2018

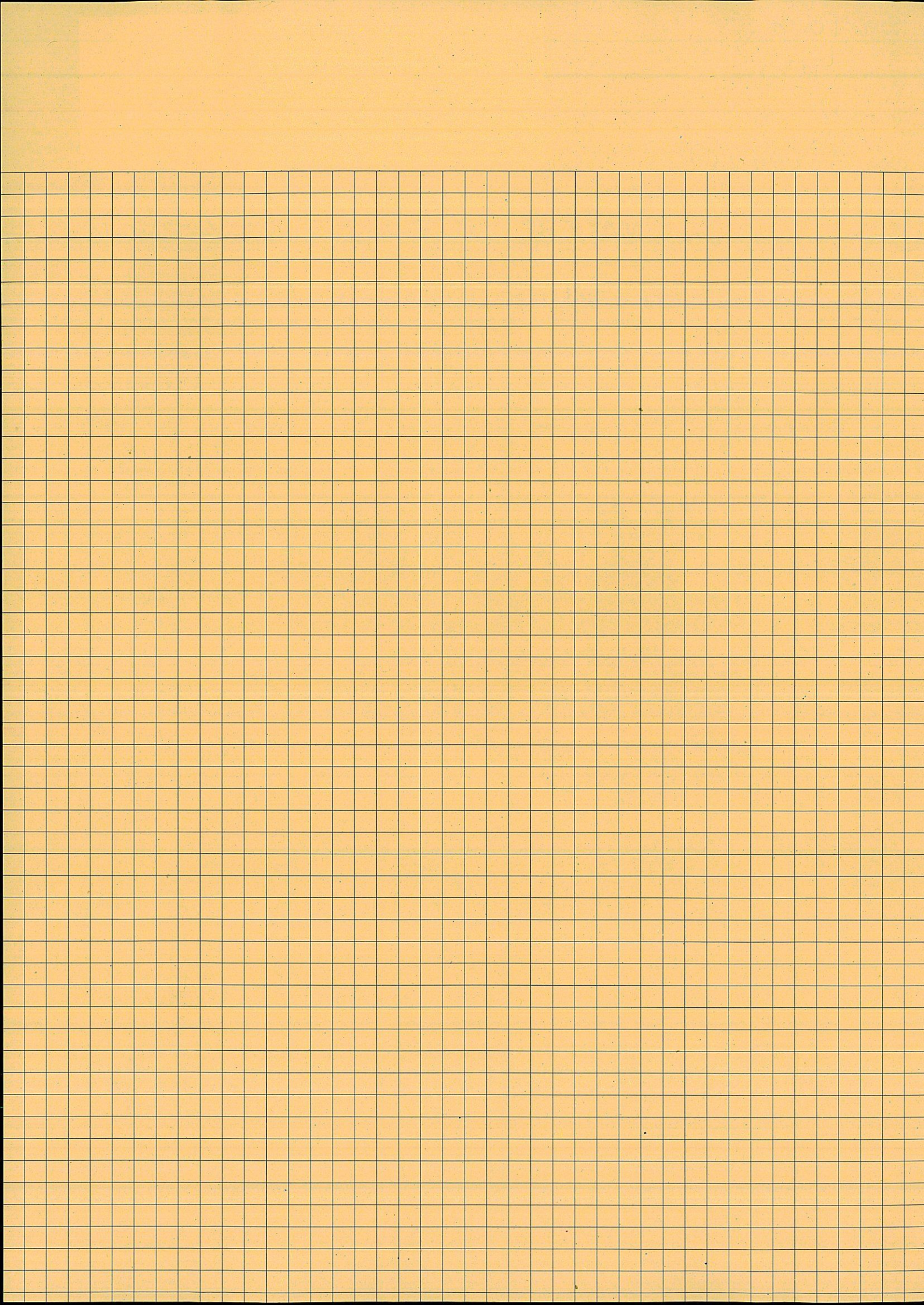
Date 12/04/17

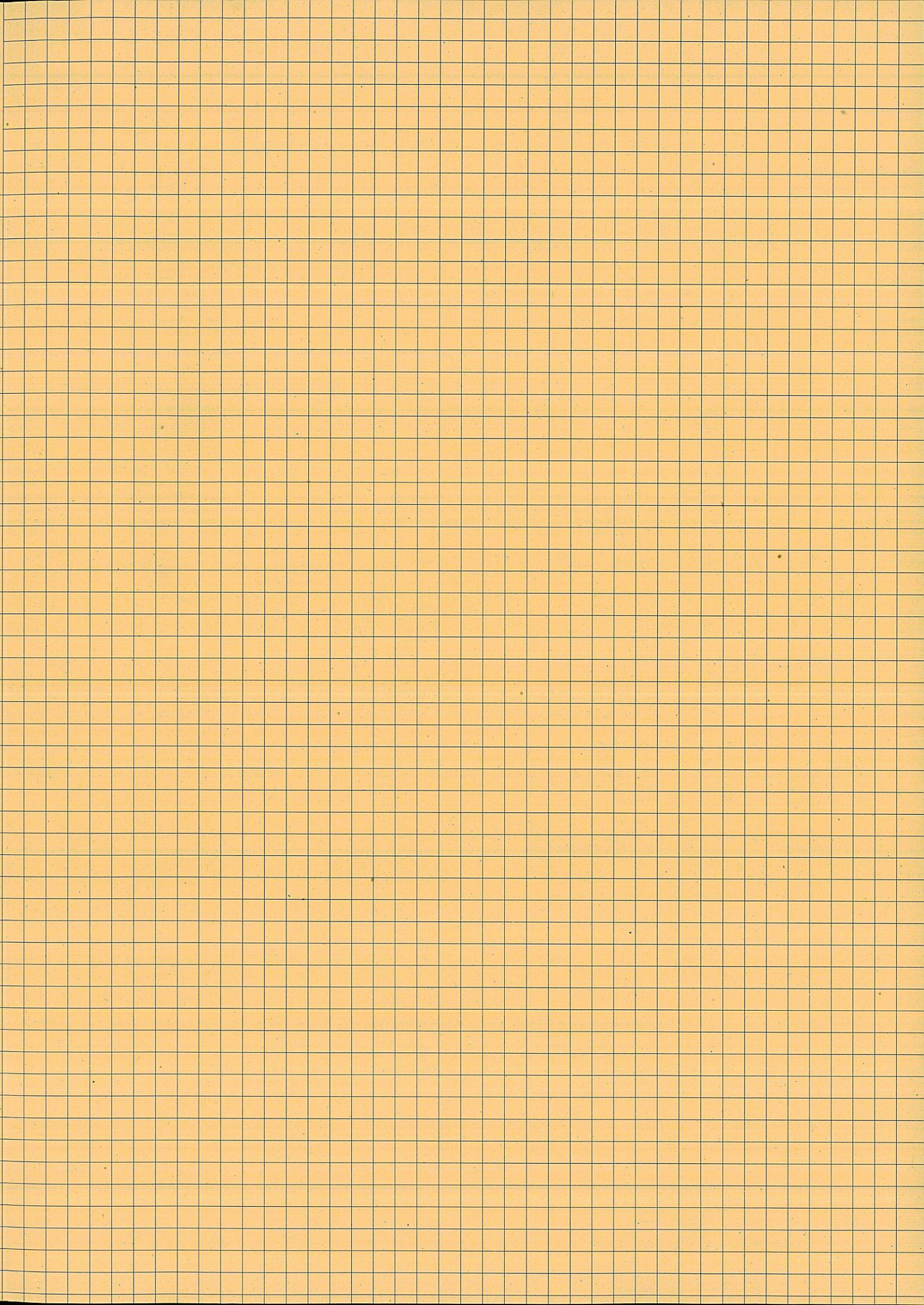


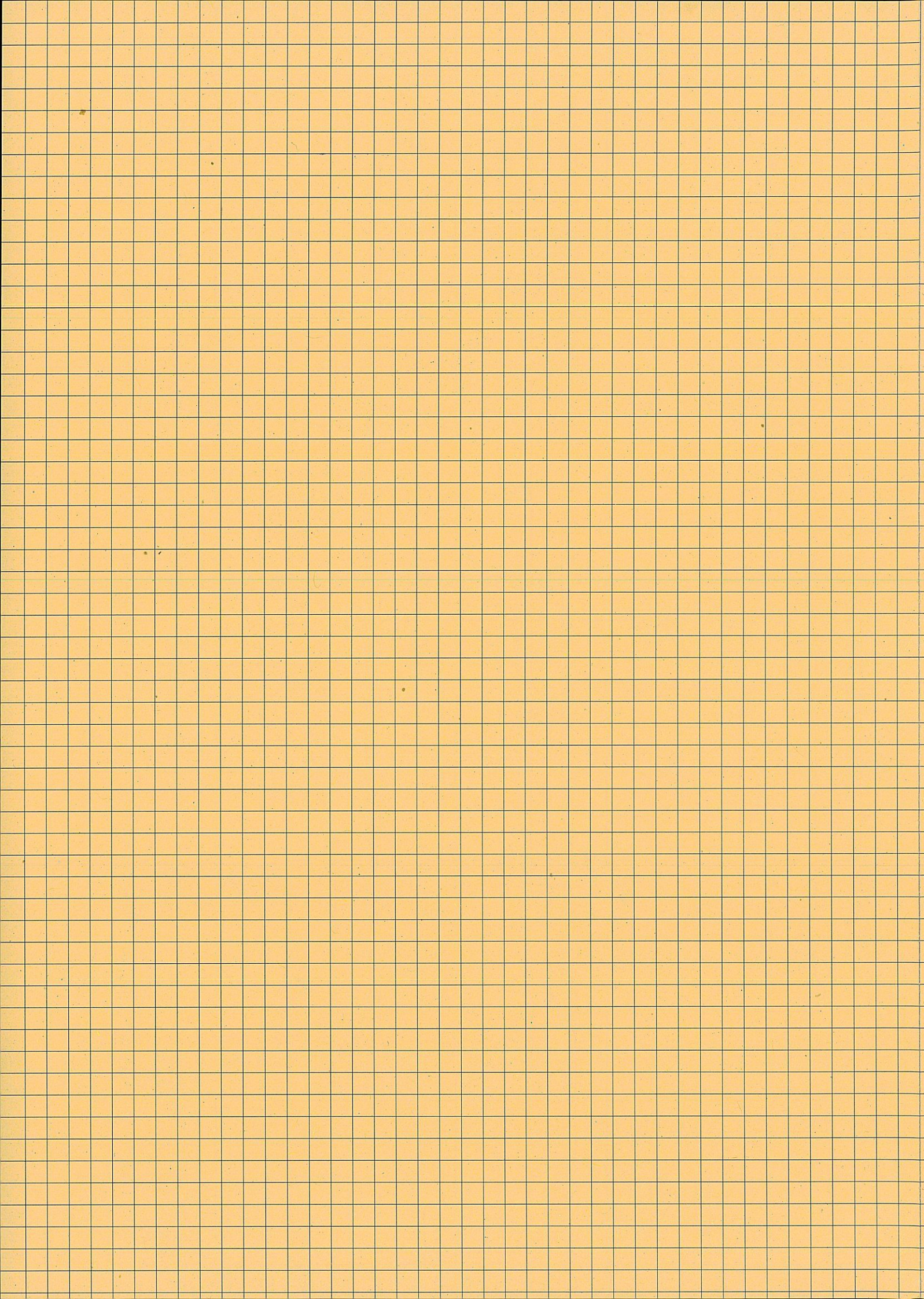
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M1 - 2016

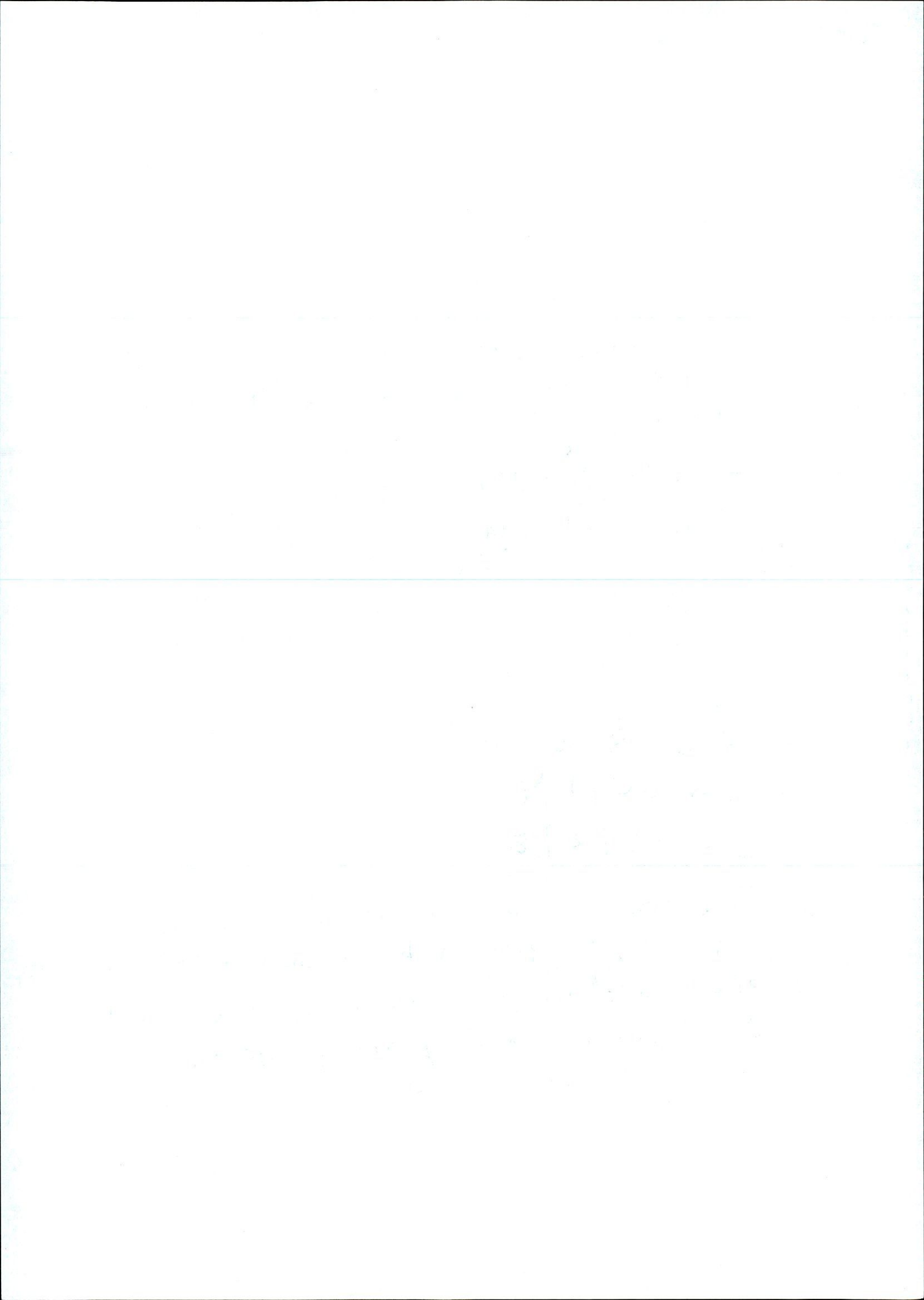
MATIÈRE Introduction to linguistics

This contains the subject (2 pages)









7. (3 points) Describe the language $L(G)$ generated by grammar G . Only a set of production rules P is given. S is a start rule.

$$S \rightarrow aS \mid bS \mid aA$$

$$A \rightarrow aB \mid bB$$

$$B \rightarrow \epsilon$$

Put your solution here:

This grammar validates words that can loop through a and b from 0 to some number, then a "a", then a final "a" or "b".

$$L = \{a, b\}^* a \{a, b\}$$

3

Sample words: aa bab
 ab $etc...$
 aaa
 bb
 ba

8. (4 points) Given a description of a language L create grammar G that generates the language $L(G)$. List a set of production rules P . Make rule S a start rule.

$$L = \{a, ab, abc, abca, abcab, abcabc, abcabca, abcabcab, abcabcabc, \dots\}$$

Put your solution here:

$$S \rightarrow aB \mid a$$

$$B \rightarrow bC \mid b$$

$$C \rightarrow cS \mid c$$

4

These rules make a word start by "a", then either stop there, or append a "b", or append a "b" and stop there, or append a "c" and stop there, or append a "c" and start from the beginning meaning appending another "a" and so on.

9. (4 points) Assign grammar class to each grammar example:

- | | | |
|----|---|---|
| 1. | $S \rightarrow SAB \mid AB$
$A \rightarrow Aa \mid a$
$B \rightarrow Bb \mid b$ | <input type="radio"/> Regular grammar
<input type="radio"/> Context-sensitive grammar
<input type="radio"/> Unrestricted grammar
<input checked="" type="radio"/> Context-free grammar + |
| 2. | $S \rightarrow Sa \mid Sb \mid \epsilon$ | <input checked="" type="radio"/> Regular grammar
<input type="radio"/> Context-sensitive grammar
<input type="radio"/> Unrestricted grammar
<input type="radio"/> Context-free grammar + |
| 3. | $S \rightarrow LBRP$
$B \rightarrow BB$
$BR \rightarrow RCC$
$LRC \rightarrow aLR$
$aLRP \rightarrow a$ | <input type="radio"/> Regular grammar
<input type="radio"/> Context-sensitive grammar
<input checked="" type="radio"/> Unrestricted grammar
<input type="radio"/> Context-free grammar + |
| 4. | $S \rightarrow aSBa \mid aba$
$aB \rightarrow Ba$
$bB \rightarrow bb$ | <input type="radio"/> Regular grammar
<input checked="" type="radio"/> Context-sensitive grammar
<input type="radio"/> Unrestricted grammar
<input type="radio"/> Context-free grammar + |

Question	Points	Score
1	3	3
2	1	1
3	1	0
4	1	1
5	1	1
6	2	2
7	3	3
8	4	4
9	4	4
Total:	20	19

19

1/2

Answer the questions in the spaces provided. Question with choices have only one correct answer. Exam will take 1 hour and 45 minutes.

Name and surname [CAPS LOCK]: POUPA ADRIEN

1. (3 points) Give three examples of alphabets:

- 1. $\Sigma = \{a, b\}$ +
- 2. $\Sigma = \{0, 1\}$ +
- 3. $\Sigma = \{a, b, 0, 1\}$ +

3

2. (1 point) What is the length of the word that consists of three empty words $|\epsilon\epsilon\epsilon| = ?$

- 0 +
- 1
- 3

1

3. (1 point) Given an alphabet $\Sigma = \{x, k\}$ what is the closure Σ^* over this alphabet (Kleene closure/star)?

- $\Sigma^* = \{\epsilon\}$
- $\Sigma^* = \{\epsilon, x, k\}$ -
- $\Sigma^* = \{\epsilon, x, k, xk, kx, xx, kk\}$
- $\Sigma^* = \{\epsilon, x, k, xk, kx, xx, kk, xkx, xkk, kxk, kxx, xkk, xxx, kkk, kxx, xkxk, xkxx, \dots\}$

0

4. (1 point) Which language L_i cannot be build over a binary alphabet $\Sigma = \{0, 1\}$?

- $L_1 = \{\epsilon\}$
- $L_2 = \{0, 00, 000, 0000, 00000, 000000, 0000000, 00000000, 000000000, \dots\} = \{0^n | n \geq 1\}$
- $L_3 = \{01, 012, 10, 102, 01012, 10102, 0101012, 1010102, 010101012, 101010102, \dots\}$ +
- $L_4 = \{\epsilon, 0, 1, 01, 10, 11, 00, 010, 011, 100, 101, 110, 111, 000, 001, 0100, 0101, 0110, 0111, \dots\}$

1

5. (1 point) What is the set of terminals V_T for grammar G defined with production rules $P = \{S \rightarrow aS, S \rightarrow b\}$?

- $V_T = \{\epsilon\}$
- $V_T = \{S\}$
- $V_T = \{S, a, b\}$
- $V_T = \{a, b\}$ +

1

6. (2 points) Arrange grammars in Chomsky's hierarchy (1-4) from the the most restrictive (1) to the least restrictive (4):

- + 1 Regular grammar
- + 3 Context-sensitive grammar
- + 4 Unrestricted grammar (recursively enumerable)
- + 2 Context-free grammar

1