

MATH3733 – “AUTO”-TEST

Test yourself. Ideally, give yourself 1 minute for each question in the first part and 2 minutes for each question in the second (hence, 20 min altogether), and try to give short but precise answers. You **may give me your answers** for checking if you feel yourself not confident concerning marking (in this case do not forget to write your name in the sheet of paper). **Neither result will be counted in your exam mark.** I suppose that the knowledge of correct answers to **all** questions (a) is absolutely necessary for this course, and (b) must be taught during previous years: you certainly have heard all – or almost all – answers one day.

- Part 1
- (1) What is called a random variable (r.v.)?
 - (2) Two events are independent, – what does it mean?
 - (3) Two r.v.'s are independent, – what does it mean?
 - (4) The same for several events and several random variables.
 - (5) What is called probability?
 - (6) What is a (cumulative) distribution function of a random variable (r.v.) X ?
 - (7) What is called a density of a r.v. X ?
 - (8) What is called an expectation (or mean value) of a r.v. X ?
 - (9) What is called a variance of a r.v. X ?
 - (10) What is called a **normal** or **Gaussian** random variable? (A correct answer means that you write its density.)
 - (11) For the Gaussian r.v. $X \sim \mathcal{N}(0, 1)$, write its expectation and variance.
 - (12) The same for the Gaussian r.v. $X \sim \mathcal{N}(a, \sigma^2)$.

- Part 2
- (1) Let X, Y be two random variables. Under what assumption

$$E(X + Y) = EX + EY?$$

- (2) Let X, Y be two random variables. Under what assumption

$$\text{var}(X + Y) = \text{var}(X) + \text{var}(Y)?$$

- (3) What is the Law of Large Numbers? (A correct answer means some statement under certain assumptions.)
- (4) What is the Central Limit Theorem or the De Moivre - Laplace theorem? (A correct answer means some statement under certain assumptions.)