

## MATHEMATICS FOR CS, A15, TEST 4

Name: \_\_\_\_\_

Student number \_\_\_\_\_

(1) (3 marks) Solve the linear system

$$2x + 2y + z = 1$$

$$x + 2y - 3z = 2$$

$$x + y - 2z = 3$$

using Gauss elimination. No marks will be given if you solve using a different technique.

(2) (3 marks) Solve the linear system

$$3x_1 - 2x_2 - x_3 - x_4 = 4$$

$$2x_2 + x_3 - 2x_4 = 2$$

$$x_2 + 2x_3 - 3x_4 = 4$$

$$-x_3 - x_4 = 5$$

using Gauss elimination. No marks will be given if you solve using a different technique.

(3) (3 marks) Solve the linear system

$$\begin{aligned}2x - y + z &= -5 \\x - z &= 2 \\-x + 3y + 2z &= 1\end{aligned}$$

using Cramer's rule, i.e. using determinants. No marks will be given if you solve using a different technique.

- (4) (3 marks) Joyce is the head of the software solutions department at the Canadian Impudent Bank of Confusion.
- a) Joyce has on staff 22 programmers who can code in C++. In how many ways can she assign them to 4 different team C++ programming tasks if the first task requires 9 programmers, the second 8 programmers, the third 2 programmers and the fourth 3 programmers?
- b) Joyce has 19 programmers who are fluent in Java of which 9 are female. In how many ways can she form a team of 12 programmers of which 5 are female?
- c) Joyce supervises 15 programmers fluent in Python of which 7 are senior and 8 are junior. In how many ways can Joyce form a team of 9 Python programmers so that at most two programmers on the team are junior?
- d) Joyce also manages 12 JavaScript Web developers. In how many ways can she select 6 JavaScript developers for 6 different tasks?

(5) (2 marks) a) How many selections are there in a 7/47 lottery?

b) How many length 8 passwords are there if both numbers, letters and capital letters can be used as symbols but the first symbol must be a capital letter?

(6) (2 marks) Expand and simplify the expression  $(x - 3)^5$ .

(7) (2.5 marks) a) 20,000\$ are deposited on an account paying 3.6% interest compounded daily. How long it will take for the balance to reach 28,000\$?

b) What is the effective annual interest rate for an account at 3.6% interest compounded daily?

(8) (3 marks) When you were born Grandma set up an annuity for you, which will pay 250 monthly for the next 20 years. The interest rate is 3.2% compounded monthly. What is the value of the annuity at your 20'th birthday? Would this be enough to buy you a Tesla model S for your 20'th birthday (\$95,000)? If Grandma made a single deposit when you were born, how much she should have deposited to achieve the same balance at your 20'th birthday?

- (9) (3.5 marks) Debra wants to buy a house and estimates that she could pay 1300\$ in biweekly mortgage payments over the next 25 years. The interest rate is 2.79% compounded biweekly. How much can she borrow towards the purchase of a house? What is the total value of her mortgage payments at the end of the term?