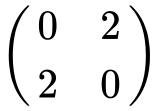
# 1.14 Introduction to matrices\_P\_2

**1a.** *[2 marks]*

Let ***A*** = .

Find ***A***.

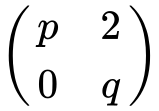


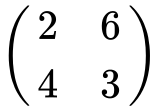
**1b.** *[2 marks]*

Find ***A***.



**1c.** *[3 marks]*

Let ***B*** = .

Given that 2***A*** + ***B*** =, find the value of  and of .



**1d.** *[2 marks]*

Hence find ***AB***.

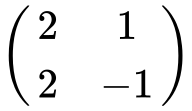


**1e.** *[2 marks]*

Let ***X*** be a 2 × 2 matrix such that ***AX*** = ***B***. Find ***X***.



**2a.** *[1 mark]*

Let ***M*** = .

Write down the determinant of ***M***.

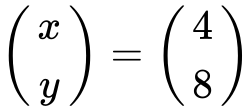


**2b.** *[2 marks]*

 Write down ***M***.

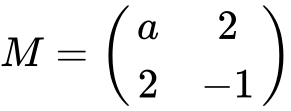


**2c.** *[3 marks]*

**Hence** solve ***M***.



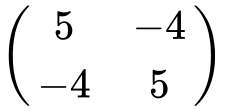
**3a.** *[4 marks]*

Let , where .

Find  in terms of .



**3b.** *[2 marks]*

If  is equal to , find the value of .



**3c.** *[6 marks]*

Using this value of , find  and **hence** solve the system of equations:

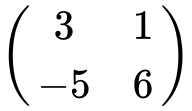
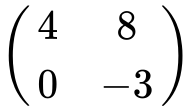
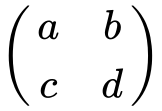






**4.** *[8 marks]*

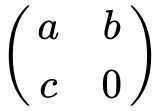
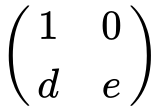
The matrices ***A***, ***B***, ***X*** are given by

***A*** = , ***B*** = , ***X*** = ,  , , , .

Given that ***AX*** + ***X*** = ***Β***, find the **exact** values of *,* *,*  and *.*



**5a.** *[2 marks]*

Let ***A*** =  and ***B*** = . Giving your answers in terms of , , ,  and ,

write down ***A*** + ***B***.



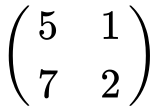
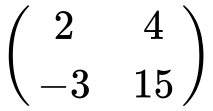
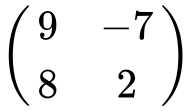
**5b.** *[4 marks]*

find ***AB***.



**6a.** *[2 marks]*

Matrices ***A***, ***B*** and ***C*** are defined by

***A*** =  ***B*** =  ***C*** = .

Let ***X*** be an unknown 2 × 2 matrix satisfying the equation

***AX*** + ***B*** = ***C***.

This equation may be solved for ***X*** by rewriting it in the form

***X*** = ***A* *D***.

where ***D*** is a 2 × 2 matrix.

Write down ***A***.



**6b.** *[3 marks]*

Find ***D***.

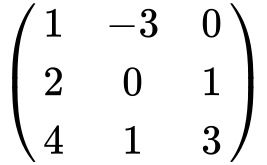


**6c.** *[2 marks]*

Find ***X***.



**7a.** *[2 marks]*

Write down the inverse of the matrix ***A*** = .



**7b.** *[4 marks]*

Hence or otherwise solve

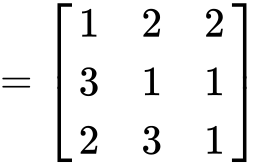








**8a.** *[7 marks]*

The matrix ***M*** is given by ***M*** .

Given that ***M*** can be written as a quadratic expression in ***M*** in the form *a****M*** + *b****M*** + *c****I*** , determine the values of the constants *a*, *b* and *c*.



**8b.** *[2 marks]*

Show that ***M*** = 19***M*** + 40***M*** + 30***I***.



**8c.** *[6 marks]*

Using mathematical induction, prove that ***M*** can be written as a quadratic expression in ***M*** for all positive integers *n*≥ 3.



**8d.** *[2 marks]*

Find a quadratic expression in ***M*** for the inverse matrix ***M***.



**9a.** *[8 marks]*

 is defined as the set of all  non-singular matrices.  and  are two elements of the set .

(i)     Show that .

(ii)     Show that .



**9b.** *[8 marks]*

A relation  is defined on  such that  is related to  if and only if there exists an element  of  such that . Show that  is an equivalence relation.



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