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| EGC_Black | **MATHEMATICS:SPECIALIST 1 & 2**  **SEMESTER 2 2015**  **TEST 4**  **Resource Free** |

Time Allowed: 25 minutes Total Marks: 24

**1.** [1, 2, 2 marks]

Given the matrices A = , B = , and I is the identity matrix, calculate

(a) A – B (b) BA

(c) BA + 2B – 3I

**2.** [2 marks]

Prove that

**3.** [1, 4, 5 marks]

(a) Find the value(s) of k for which is singular.

(b) (i) Determine the inverse of the .

(ii) Using matrices, solve the simultaneous equations:

(c) Given that and

(i) determine AB

(ii) hence, solve

**4.** [3, 4 marks]

(a) Given cos θ = for 0 ≤ θ ≤ determine the exact value of cos 2θ

(b) Given that A is an obtuse angle with sin A = and B is an acute angle with cos B = determine exactly the value for sin (A – B).

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Time Allowed: 30 minutes Total Marks: 29

**5.** [2, 2, 2, 3 marks]

Given that A, B, C, and X are all square matrices of the same order, and that all necessary inverse matrices exist, then re-arrange the following equations to make X the subject (i.e.  X = …)

(a) A + BX = C (b) XAB = C

(c) C(X – B) = A (d) BX = A + CX

**6.** [4 marks]

Rewrite 3 cos θ + 5 sin θ in the form R cos (θ – α), where α is an acute angle in degrees.

**7.** [2, 2, 2, 2 marks]

A company displays motor vehicles for sale in two different showrooms. Matrix P shows the number of vehicles for sale in each showroom. Matrix Q shows the petrol and oil requirements (in litres) for the sedans and 4-wheel drive vehicles. Matrix R gives the cost per litre for petrol and oil.

, and

(a) Give a matrix S which shows the total (combined) cost of petrol and oil products for each type of vehicle.

(b) Show how S can be used, with one of the given matrices, to obtain a matrix M listing the total cost of petrol and oil products for each showroom. Hence find the matrix M.

(c) Give a matrix T which shows the separate petrol and oil requirements for each showroom.

(d) Show how T can be used, with one of the given matrices, to obtain the matrix M in (b).

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

Prove the following:

(a)

(b) cos 3A = cos A.(1 – 4sin2 A)