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| EGC_Black | **MATHEMATICS:SPECIALIST 1 & 2**  **SEMESTER 2 2017**  **TEST 4**  **Calculator Free** |

Reading Time: 2 minutes

Time Allowed: 19 minutes Total Marks: 19

**1.** [2, 2, 2, 3 marks]

If and

determine each of the following. If any cannot be determined, state this clearly and explain why.

(a)

(b)

(c)

(d) Matrix such that .

**2.** [5 marks]

Given that is an obtuse angle with and B is an acute angle with determine exactly the value for .

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

(a) Determine

(b) Hence, solve the simultaneous equations

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| EGC_Black | **MATHEMATICS:SPECIALIST 1 & 2**  **SEMESTER 2 2017**  **TEST 4**  **Calculator Assumed** |

Reading Time: 3 minutes

Time Allowed: 31 minutes Total Marks: 31

**4.** [4 marks]

Some matrices have a special property called “anti-commutativity” where . These matrices are called Pauli-spin matrices and are useful in the study of electron spin in quantum mechanics.

Given that and are anti-commutative, find and .

**5.** [4 marks]

Rewrite in the form , where is an acute angle in degrees.

Give as an exact value and to one decimal place.

**6.** [2, 1, 2, 1 marks]

Burger Barn’s three locations sell hamburgers, fries, and soft drinks. Barn I sells burgers, orders of fries, and soft drinks each day. Barn II sells burgers a day and Barn III sells . Soft drink sales number each day at Barn II and a day at Barn III. Barn II sells and Barn III sells orders of fries per day.

(a) Display the daily sales figures in a labelled matrix.

Burgers cost each, fries per order, and soft drink costs each.

(b) Display the prices in matrix form.

(c) Use matrix multiplication to obtain a matrix that gives the daily revenue at each of the three locations.

(d) Show a matrix that could be used to determine the total daily revenue from all three locations? You do NOT need to calculate the revenue.

**7.** [3, 3 marks]

Given the matrix , find all values of for which

(a) ,

(b) is singular.

**8.** [5, 6 marks]

Prove the following:

(a)

(b)