

Groups, Surds, Matrices - Test

Q1 How many elements in each of the following sets?

(a) $E = \{\text{letters in the word TROTTER}\}$ /1

(b) $F = \{\text{the set of proper subsets of the set } \{a, b, c\}\}$ /1

Q2 True or False

(a) If $M = \{x: 2x = 6\}$, then $M=3$ /1

(b) $\{\} \subseteq \{0\}$ /1

(c) $\{5\} \in \{4, 5, 6\}$ /1

(d) $\sqrt{4} \in Q$ (Q is the rational numbers) /1

Q3 Which of the 4 group properties apply to the integers under the operation of subtraction?
For any which do not, give a counter example to prove your point.

/4

Q4 Prove that $\sqrt{2}$ is irrational.

/4

Q5 Simplify
(a) $\sqrt{20} + 2\sqrt{3} + \sqrt{27}$

/2

Q6 Show that the set of perfect cubes is closed under multiplication.

/3

Q7 If $\mathbf{A} = \begin{pmatrix} 1 & 2 \\ 0 & -1 \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} 4 & 0 & 0 \\ -2 & 1 & 5 \end{pmatrix}$ find \mathbf{AB}

/2

Q7 Show that I_3 is a right identity for 1×3 matrices.

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