

STUDENT ID NO:

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**AUSTRALIAN CATHOLIC UNIVERSITY
STRATHFIELD CAMPUS
SCHOOL OF ARTS & SCIENCES**

Mid Semester Test SEMESTER 1 2003

UNIT CODE: MATH303

UNIT TITLE: Abstract Algebra

LECTURER: W. N. Franzsen

DURATION: 1 hr

READING TIME:

WEIGHTING: 20%

SPECIAL INSTRUCTIONS TO STUDENTS:

There are 10 questions on 4 pages.

Answer all questions.

This examination is worth 20% of your final mark.

You must give reasons; if none are given then you will get no marks for that part of the question.

You may attempt any and all questions in any order you choose.

This question paper must be handed in with your answers.

EXAMINATION RULES

▪Food and drink may not be brought into the examination room. (Special consideration may be granted upon application). ▪No bags or other cases of any kind are permitted at your desk. ▪Wallets and purses must be placed on the floor under your desk. ▪Mobile phones and watch alarms must be turned off.

EXAMINATION PROCEDURES (University Handbook 5.2)

▪If you are late, you will not be admitted 30 minutes after the start time of an examination. Latecomers are not allowed extra time. ▪ID cards must be brought into each examination, produced on demand and displayed prominently on desks. ▪Candidates must complete an attendance form at every examination. ▪No writing of any kind is permitted during reading time. ▪If a candidate becomes ill during the examination and cannot continue, the supervisor will note this. The student may apply for a deferred examination. ▪There must be no communication of any kind between candidates in the examination room. ▪All textbooks, dictionaries, calculators, notes, manuscripts, bags, other materials or devices, or special assistance, except those specifically authorised for the examination must be left outside the examination area. ▪You will not be permitted to leave until 30 minutes after the commencement of writing time. ▪If you wish to leave the examination early, you should raise your hand and remain seated until your papers are collected. You may then leave. ▪You will not be permitted to leave during the last 10 minutes of writing time. ▪You must remain seated until your examination paper is collected. ▪A candidate who commits an infringement of Examination Room Procedures is guilty of misconduct. The Supervisor may expel the candidate immediately from the examination room. ▪Misconduct involving cheating or collusion between students is considered a serious offence and may result in the candidate being expelled from the examination room. The Discipline Committee is also informed and penalties may be applied.

**EXAMINATION PAPERS MUST NOT BE REMOVED FROM THE EXAMINATION ROOM
ALL UNUSED MATERIALS AND SCRAP PAPERS MUST BE LEFT ON THE CANDIDATE'S
DESK**

1. Carefully, and in complete detail, define each of the following terms, expressions and notations. If a definition only makes sense in a particular situation you should explain the conditions needed for the definition to make sense. For example, if I had asked you to define the notation $x \equiv y \pmod{m}$ your answer must include the facts that x, y and m are all integers and $m > 1$.

- (a) G is a group.
- (b) $H \leq G$
- (c) $N \triangleleft G$
- (d) $[G : H]$
- (e) $o(g)$
- (f) A conjugate of g .
- (g) g^n for $n \in \mathbb{Z}$.
- (h) G is an Abelian group.
- (i) D_n
- (j) S_n
- (k) $f : A \rightarrow B$ is a function.
- (l) $f : A \rightarrow B$ is injective.
- (m) $f : A \rightarrow B$ is surjective.
- (n) R is a relation on X .
- (o) Left coset.
- (p) $\langle X \rangle$ where $X \subseteq G$.
- (q) G is cyclic.
- (r) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 2 & 1 & 5 & 4 \end{pmatrix}$
- (s) Equivalence class.
- (t) An equivalence relation.
- (u) The order of G .
- (v) $(1352)(4679)$
- (w) G is an infinite group.
- (x) 5-cycle.
- (y) ρ is a permutation.
- (z) Odd permutation.