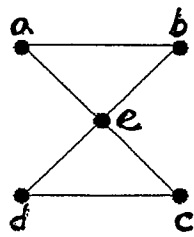


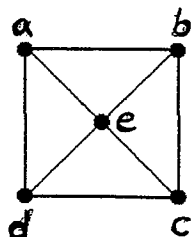
招生學年度	103	招生類別	碩士班
系所班別	資訊工程學系碩士班 (資工甲組)		
科目名稱	離散數學		
注意事項	本考科禁止使用掌上型計算機		

There are 8 questions and 100 marks total.

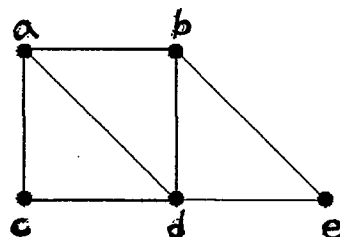
- (10%) Find the integer a such that
 - $a \equiv 23 \pmod{31}$ and $-15 \leq a \leq 15$.
 - $a \equiv 97 \pmod{41}$ and $100 \leq a \leq 140$.
- (10%) Let A, B , and C be three sets. Show that $\overline{A \cup (B \cap C)} = (\overline{C} \cup \overline{B}) \cap \overline{A}$.
- (10%) Determine whether each of these functions is a bijection from \mathbf{R} to \mathbf{R} where \mathbf{R} denotes the set of real numbers.
 - $f(x) = x^3 + 1$
 - $f(x) = (x^2 + 1)/(x^2 + 2)$
- (10%) How many ways are there to select a first-prize winner, a second-prize winner, and a third-prize winner from 100 different people who have entered a contest?
- (15%) In how many different ways can eight identical cookies be distributed among three distinct children if each child receives at least two cookies and no more than four cookies?
- (15%) Prove that every amount of postage of 12 cents or more can be formed using just 4-cent and 5-cent stamps.
- (15 points) Determine whether the relation R on the set of all real numbers is reflexive, symmetric, antisymmetric, and/or transitive, where $(x, y) \in R$ if and only if
 - $x + y = 0$.
 - $x - y$ is a rational number.
 - $xy \geq 0$.
- (15%) An *Euler path* is a path in a graph which visits every edge exactly once. An *Euler circuit* is an Euler path which starts and ends on the same vertex. Which of the undirected graphs in the figure below have an Euler circuit? Of those that do not, which have an Euler path?



G_1



G_2



G_3