

# 中原大學 95 學年度博士班入學考試

6 月 7 日 10:30~12:00 應用數學系

誠實是我們珍視的美德，  
我們喜愛「拒絕作弊，堅守正直」的你！

科目：離散數學

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可使用計算機，惟僅限不具可程式及多重記憶者

不可使用計算機

1. Find a graph  $G$  with 7 vertices such that  $G$  and its complement both have an Euler cycle.(15%)
2. Let  $I$  be a (vertex ) independent set of a graph  $G$ . Let  $v$  and  $e$  be the numbers of vertices and edges in  $G$ , respectively. Show that if  $e - \sum_{x \in I} (\deg(x) - 2) < v$ , then  $G$  have no Hamilton circuit.(15%)
3. Sort the list 5, 4, 0, 9, 2, 6, 7, 1, 3, 8 using a merge sort.(20%)
4. Use a generating function to find the number of ways to select 10 balls from a large pile of red, white, and blue balls if the selection has at most two red balls. (15%)
5. How many arrangements of the integers 1 through  $n$  are there in which  $i$  is never immediately followed by  $i+1$ , for  $i=1,2,\dots,n-1$ .(15%)
6. Find the number of different  $m$ -colorings of the vertices of the following floating figure.(20%)

