

國立高雄大學應用數學系

有獎徵答

(2015 年 3 月)

1. 將於學期間公告6道題目，由系上老師出題，歡迎同學來挑戰。
2. 同學解出任何一題皆可將解答投稿到系辦 (答案紙格式可於系網頁上下載)。或利用電子郵件 math@nuk.edu.tw (主旨：○○○年○月第○題解答)

01

Suppose that $f(x)$, $g(x)$, and $h(x)$ are continuous on $[a, b]$ and are differentiable on (a, b) . Prove that there exists $\xi \in (a, b)$ such that

$$\begin{vmatrix} f'(\xi) & g'(\xi) & h'(\xi) \\ f(a) & g(a) & h(a) \\ f(b) & g(b) & h(b) \end{vmatrix} = 0.$$

[林英杰教授出題，微積分]

02

For $n \geq 1$, let G_n be the graph with $2n$ vertices and $3n - 2$ edges as below. Let a_n be the number of spanning trees ¹ in G_n . For example, $a_1 = 1$, $a_2 = 4$ and $a_3 = 15$. Determine a recurrence relation for a_n and use it to obtain a formula for a_n in terms of the parameter n .



[張惠蘭教授出題，組合數學]

¹A *spanning subgraph* of a graph G is a subgraph with vertex set $V(G)$. A *spanning tree* is a spanning subgraph that is a tree.