

國立台灣科技大學九十五學年度碩士班招生試題

系所組別：建築系碩士班乙組

科目：電腦在建築上之應用

總分 100 分，共六題

第一題 (15 分，三小題)

空間設計師為一業主進行其住宅中玄關、客廳與餐廳三空間的色彩計畫。業主考量紫、藍、綠、黃、紅、白等六種色系，但有下列六項要求：

- 三個空間各須採用不同色系
- 一定要用紅色系
- 客廳不得使用綠色或白色系
- 餐廳不得使用白色系
- 如果用了白色系，就不得選用黃色系
- 如果用了綠色系，就不得選用藍色系

請依上述要求，回答下列問題。

- (5 分) 如果玄關使用黃色系，則客廳與餐廳的色彩計畫共有哪些可能？
- (5 分) 如果不使用紫色系，也不使用黃色系，則色彩計畫共有哪些可能？
- (5 分) 如果只遵守 A 與 B 項業主要求而忽略其他要求，則共有幾種色採搭配的可能？

第二題 (30 分，兩小題)

建築圖面繪製時常將建築構件分屬不同圖層儲存，以利甄別、修改，然而圖層因內容不同而有不同修改權限，現在有結構、外牆、內牆、家具、水電設備等圖層。

- (15 分) 請指定各圖層相對權限高低，並說明理由，使設計變更時較不易造成顧此失彼、圖面內容不一致情形。
- (15 分) 除設定權限外，請例舉二種方法或資料形式，讓設計圖面更改時不同專業之協力參與者在設計整合時，不易更改非本身權限可變動之內容。

第三題 (10 分)

某繪圖人員要把所繪製的平面圖轉成影像檔以製作電腦簡報。其所規劃的圖面寬度佔投影畫面寬度的 $1/2$ ，而投影機的解析度為 1024×768 個畫素。因為圖面頗複雜，這位繪圖人員為求較好的畫面品質，在轉檔時將圖面的水平解析度設定為 4096 個畫素。請問你對這樣的設定有何看法？你認為這張圖面的影像檔解析度應該如何設定才是最理想的做法？

第四題 (5 分)

有一個遞迴函數 $f(n)$ ， n 為正整數，函數定義如下：

- $f(1) = 1$
- $f(2) = 3$
- 當 $n > 2$ 時， $f(n) = f(n-1) + f(n-2)$

請問 $f(8)$ 的值是多少？

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第五題 (20 分)

結合數位資訊科技與建築的「智慧生活空間」研究，是新世紀重要的探索課題。美國麻省理工學院 (MIT) 建築與規畫學院學者 Stephen Intille 發表論文《Designing a Home of the Future》(Intille, S. S., "Designing a home of the future," *Pervasive Computing, IEEE*, vol. 1, no. 2, pp. 76-82, Apr-Jun 2002.)，闡述未來住宅的設計目標，他寫到：

If we are to believe most movies, television, and popular press articles that mention home life in the future, we will have complete control over our spaces at the touch of a button. In fact, our homes will be so fully automated and "smart" that we will rarely have to think about everyday tasks at all. We will spend nearly all our time in the home engaged in leisure activities because digital and robotic agents will have taken over the mundane chores of day-to-day life.

Researchers and technologists are more cautious in predicting the future of the home. A survey of ongoing work shows, however, that there is a bias toward creating automatic (smart) home environments that eliminate the need to think about tasks such as controlling heating and lighting, going to the grocery store, scheduling home appliances, and cooking.

Although our team might use automation to help people accomplish tasks they cannot perform on their own because of a disability or frailty, our primary vision is not one where computer technology ubiquitously and proactively manages the details of the home. Technology should require human effort in ways that keep life as mentally and physically challenging as possible as people age. We are designing and building prototypes demonstrating how to create environments that help people

- Live long and healthy lives in their homes
- Reduce resource consumption
- Integrate learning into their everyday activity in the home

To accomplish these goals, we envision computer technology as ever-present but in a more subtle way. Information will be presented to people at precisely the time and place they need it. We want our pervasive technologies to empower people with information that helps them make decisions; we do not want to strip people of their sense of control, which has been shown to be psychologically and physically debilitating.

你贊同 Stephen Intille 對未來住宅的論述嗎？請由「建築」的本質出發，結合「數位資訊處理」與「網路科技」的特性，申論你贊同或不贊同的原因，並推論「建築專業」的未來發展。

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第六題(20分，四小題)

Given two sets, D_1 and D_2 , the Cartesian product of D_1 and D_2 , in symbols $D_1 \times D_2$, is the set of ordered pairs (v_1, v_2) , such that v_1 is an element of D_1 and v_2 is an element of D_2 . For example, given the sets $A = \{1, 2, 4\}$, $B = \{a, b\}$, the Cartesian product $A \times B$ is the set of all the possible pairs in which the first element belongs to A and the second to B . Since A has three elements and B has two, we have six pairs:

$$\{(1, a), (1, b), (2, a), (2, b), (4, a), (4, b)\}$$

A relation on the sets D_1 and D_2 is a subset of $D_1 \times D_2$. Given the sets A and B above, an example relation on A and B consists of the set of pairs $\{(1, a), (1, b), (4, b)\}$

The definitions of Cartesian product and relation refer to two sets, but can be generalized with respect to the number of sets. Given $n > 0$ sets D_1, D_2, \dots, D_n , not necessarily distinct, the Cartesian product of D_1, D_2, \dots, D_n , represented by $D_1 \times D_2 \times \dots \times D_n$, is made up of the set of the n -tuples v_1, v_2, \dots, v_n , such that v_i belongs to D_i , for $1 \leq i \leq n$. A mathematical relation on the domains D_1, D_2, \dots, D_n is a subset of the Cartesian product $D_1 \times D_2 \times \dots \times D_n$. The number n of the components of the Cartesian product (and therefore of every n -tuple) is called the degree of the Cartesian product and of the relation.

Given three sets $C = \{\text{Mary, John}\}$, $D = \{\text{loves, hates}\}$, $E = \{\text{apple, cat, cake}\}$

1. (5分) Please write down the Cartesian product of D and E .
2. (5分) What is the number of possible non-empty relations (relations that have at least one element) of sets D and E ?
3. (5分) How many elements are there in $C \times D \times E$?
4. (5分) What is the degree of $C \times D \times E$?

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