

1. (15 pts.) In a large accounting firm, the proportion of accountants with MBA degrees and at least 5 years of professional experience is 75% as large as the proportion of accountants with no MBA degree and less than 5 years of professional experience. Furthermore, 35% of the accountants in this firm have MBA degrees, and 45% have less than 5 years of professional experience. If one of the firm's accountants is selected at random, what is the probability that this accountant has an MBA degree or at least 5 years of professional experience but not both?
2. (20 pts.) There are three doors: 1, 2, 3. A grand prize lies behind one door; nothing lies behind the other doors. The contestant wins the prize by choosing the correct door. The game begins with the contestant choosing an initial door. Monty Hall then opens one of the other doors, showing that nothing lies behind it, and asks the contestant whether she wants to keep the original door, or to choose the other unopened door.
  - (a) Compute the probability that this contestant decides to change doors.
  - (b) Compute the probability that this contestant decides not to change doors.

Define Events before any analysis. Solutions without the event definition will get zero credit.

3. (15 pts.) We assume that there are  $N$  voters in the population, of whom  $N_R$  will vote for Republican and  $N_D$  will vote for the Democrat. The eventual winner will be the Republican if  $N_R > N_D$ , and will be Democrat otherwise, but we don't know which until all of the votes are tabulated. (To simplify the example, we assume there are only two candidates and that the election will not be in a tie.) Let's suppose that a small percentage of the votes have been counted and the Republican is currently ahead 540 to 460. On what basis can the networks declare that Republican the winner?
4. (30 pts.) 「資料挖礦」(Data mining) 係經由統計方法與數值分析技術從大量混雜的資料裡篩選擷取出有用的知識，例如，高風險的子群體，特殊的關連性等，以輔助相關決策與分析。假設某銀行推出第一年免年費的「龍貓卡」並附龍貓玩偶一隻，發卡量突破 200 萬張。然而從一年後的帳面資料初步分析發現其中有 15% 客戶領卡後從未使用，5% 刷爆後列為壞帳，只有 10% 列為高消費無風險的「黃金顧客」(所謂的金礦)。請具體詳述如何利用幾種特定的統計分析方法由大量資料(包括顧客基本資料、每筆交易記錄等)中挖掘得到可能有用的「資訊」(請說明)，如，進一步找到重要的顧客，或避免發卡給信用不好的客戶(20 pts.)。此外，並請另舉一個類似上述銀行業資料挖礦概念的例子與所對應的統計方法應用(10 pts.)。

5. 某電腦製造公司欲從以下三個方案當中，選擇一個投資方案來實施。其投資收益隨市場好壞而定，如下表：

	A 方案	B 方案	C 方案
市場好	\$ 100 million	\$ 10 million	\$ 20 million
市場普通	\$ 10 million	\$ 5 million	\$ 100 million
市場壞	\$ -150 million	\$ -10 million	\$ -100 million

(1) (10 pts.) 若已知市場好、普通、壞的機率分別受到 WINDOW2000 作業系統推出快慢影響，如下表。根據估計，作業系統推出快、慢的機率分別為 60%、40%。

	若「推出快」	若「推出慢」
市場好	60%	30%
市場普通	20%	40%
市場壞	20%	30%

則由期望之金錢收益來看，應選擇哪一案？

(2) (10 pts.) 若作業系統推出快、慢的機率乃是估計值，各有可能上下 10% 幅度變化（即作業系統推出快的機率 40%  $\leftrightarrow$  60%），則當估計值有多少改變時，會影響上述方案選擇？