所別：企業管理學系碩士班 企業電子化組(庚組) 科目：離散數學

共 10 題每題 10 分共 100 分

1. Let A = {a, b, c, 1, 2, 3} and B = {c, d, 1, 3}, what are the answers for the following questions:
   a. $A \cap B$
   b. $|A|$
   c. Is $A \subseteq B$?

2. Please use mathematical induction to prove $2^m > m$ for all natural numbers, m with $m \geq 1$.
3. Please write an algorithm that takes a sequence of real numbers, $x_1, x_2, \ldots, x_n$ and returns the value of the average of these numbers.
4. A foreman has a team of 15 workers. He needs 5 of them to unload a truck full of bricks, 3 to start mixing cement, and 4 to clean up yesterday's mess. In how many ways can he create the work groups?
5. Suppose that P(A) = 0.3, P(B) = 0.6 and P(A|B) = 0.4, please calculate $P(A \cap B)$ and P(B|A).
6. Please write a recursive algorithm to compute the summation of 1, 2, .. n with the formula of $\Sigma^{n}_{k=1} k = n + \Sigma^{n-1}_{k=1} k$.
7. Determine whether 1011 belongs to each of these regular sets:
   a. 10^*1^* b. $0^*(10 \cup 11)^*$

8. Please explain what a strongly connected graph is.

9. Please build a binary search tree using the following values in a left-to-right order: d f c a b t w r s.

10. Find the domain and range of these functions:
    a. the function that assigns each pair of integers to the maximum of these two integers
    b. the function that assigns each set of integers to the maximum of these integers