共 12 大題。總分 100 分。

1. 【10 points】 It is known that 10% of certain articles manufactured are defective. What is the probability that a random sample of 12 such articles, at least 9 are defective?
2. 【10 points】 How many solutions are there for $x_1+x_2+x_3+x_4=30$ with $20 \geq x_i \geq -10$ for $4 \geq i \geq 1$.
3. 【10 points】 How many ways can the 26 letters of the alphabet be permuted so that none of the patterns "car", "dog", or "cartoon" occurs?
4. 【10 points】 Use directed graphs to show the transitive closures of the relation $R = \{(1,2), (2,4), (3,4), (4,1)\}$.
5. 【10 points】 If R is the equivalence relation on $A = \{1, 2, 3, 4, 5\}$ that induces the partition $\{1, 2\} \cup \{3, 4\} \cup \{5\}$, what is R?
6. 【10 points】 Prove by induction that at most $n+1$ comparisons are required to determine if a particular number is in a list of 2^n numbers sorted in non-decreasing order.
7. 【10 points】 Draw the Huffman tree associated with characters {"a", "b", "c", "d"} for encoding the input string "aabaacbcdbdbcadbacab".
8. 【10 points】 Construct a truth table for the statement "if p then q else r".
9. 【5 points】 If a class has 89 students, how many (at least) must have a birthday on the same day of the week?
10. 【5 points】 As above. How many functions are there with domain "students" and codomain "the same day of the week"?
11. 【5 points】 Construct a truth table for the statement $\neg(p \vee q) \vee \neg(p \wedge q)$.
12. 【5 points】 As above. Draw a combinatorial circuit that realize it.

試題隨卷繳回