The Examination Paper for **Discrete Mathematics I （离散数学 I ）** of Jinan University

Section I: Proof

1. Show that if n is an integer and n^3+5 is odd, then n is even using
   a) a proof by contraposition.
   b) a proof by contradiction.

2. Proof that $f(x) = 6x^2 + 5x + 4$ is $O(x^2)$.

Section II: Drawing/Calculation

1. Draw the Venn diagrams for the combination of the sets A, B, C : $\overline{A} \cup (\overline{B} \cap \overline{C})$

2. Solve the linear congruence $2x \equiv 5 (\mathrm{mod}\, 9)$.

Section III: True/False

1. $(A8E)_{16} = (101010001101)_2$.

2. $(\neg p \wedge (p \vee q)) \rightarrow q$ is a tautology.

Section IV: Completion

1. An algorithm is called_____if it solves a problem by reducing it to an instance of the same problem with smaller input
2. Among 256 people there are at least_____who were born in the same month.

Section V: Choices

1. Which is not one of the properties that algorithms generally share?

   A. Definiteness B. Finiteness C. Generality D. Comparability

2. Let S= {1}. Which of the following is not a subset of P(S) (the power set of S).

   A. {Φ}. B. {1}. C. {{1}}. D. {Φ, {1}}.