✓ **For each of these arguments determine whether the argument is correct (T) or incorrect (F) (是 非題 25pts)**

1. _____ Everyone enrolled in the university has lived in a dormitory. Mia has never lived in a dormitory. Therefore, Mia is not enrolled in the university.

2. _____ A easy book is fun to read. Mary's book is difficult to read. Therefore, Mary's book is not fun to read.

3. _____ Mary likes all teachers. Mary likes Mr. Lee. Therefore, Mr. Lee is a teacher.

4. _____ If x is a positive real number then x^2 is a positive real number. Therefore, if a^2 is positive, where a is a real number, then a is a positive real number.

5. _____ If $x^2 \neq 0$, where x is a real number, then $x \neq 0$. Let a be a real number with $a^2 \neq 0$, then $a \neq 0$.

✓ **Show the work in details to get full credits**

1. (10 pts) Suppose $n \geq 1$ is an integer. How many functions are there from the set $\{1, \ldots, n\}$ to the set $\{1,2,3\}$?

2. (10 pts) What is the minimum number of students required in a discrete mathematics class to be sure that at least six were born in the same month?

3. (10 pts) Which of these relations on the set of all people are equivalence relations?
   (a) $\{(a,b)|$ a and b are the same age$\}$
   (b) $\{(a,b)|$ a and b speak a common language$\}$

4. (20 pts) For primitive statements p, q and r. Show that $(p \rightarrow r) \vee (q \rightarrow r)$ and $(p \wedge q) \rightarrow r$ are logically equivalent. Using
   (a) Truth table
   (b) Logical equivalence

5. (10 pts) Show that if n is a positive integer, then $1 + 2 + \cdots + n = \dfrac{n(n+1)}{2}$

6. (15 pts) Let $A=\{0,2,4,6\}$ $B=\{0,1,2,3\}$ $C=\{0,3,6\}$ What are (a) $A \cup B \cup C$　(b) $A \cap B \cap C$　(c) $A \cap (B \cup C)$