1. 10 students

a) 15 chairs?

$$A_{15}^{10} = \frac{15!}{(15-10)!} = \frac{15!}{5!}$$

b) 10 chairs!

$$A_{10}^{10} = 10!$$

2. Possible outcomes:

a) Three dice are rolled

$$6^3 = 216$$

b) two letters and three digits are rand. select.

$$26^2 \cdot 10^3$$

3. a) $C_{25}^{10} = \frac{25!}{10!(25-10)!}$

b) $C_5^3 \cdot C_{20}^7$

c) $C_5^3 \cdot C_3^2 \cdot C_{17}^5$

4. A_i = the i-th ticket is a winning one

a) $A = \bigcap_{i=1}^{m} A_i$

b) $B = \bigcap_{i=1}^{m} \overline{A_i}$

c) $C = \bigcup_{i=1}^{m} A_i = B$

d) $D = \bigcup_{i=1}^{m} D_i = \bigcup_{i=1}^{m} \left(A_i \setminus \bigcup_{i \neq j} A_j\right)$ $D_1 = A_1 \cap \left(\bigcap_{i=2}^{m} \overline{A_i}\right)$

D = only the i-th ticket is a winning one

$D_i = A_i \cap \left(\bigcap_{j=2} \overline{A_j}\right) = A_i \cap \left(\overline{\bigcup_{i \neq j} A_j}\right) =$

$= A_i \setminus \bigcup_{i \neq j} A_j$

e) $E = \bigcup \left(\left(A_i \cap A_j\right) \setminus \bigcup_{k \neq i,j} A_k\right)$

5. a) $A = A_1 \cup A_2 \cup A_3$

b) $B = \overline{A_1} \cap \overline{A_2} \cap \overline{A_3}$

c) $C = A_1 \cap A_2 \cap A_3$

d) $D = (A_1 \cap \overline{A_2} \cap \overline{A_3}) \cup (\overline{A_1} \cap A_2 \cap A_3) \cup (\overline{A_1} \cap \overline{A_2} \cap A_3)$