Problem 3

Let's denote u is the number of delegates from United State, c is the number of delegates from Canada and m is the number of delegates from Mexico. Then, u, c and m are satisfied following conditions.

i) $2 \leq u,\, c,\, m \leq 7$

ii) $c \leq u$

iii) $u \leq m$

iv) $u+c+m=15$

Combining three inequalities, we can get $2 \leq c \leq u \leq m \leq 7$. Let's classify the number of delegates from each country.

1) $(c,\, u,\, m)=(2,\, 6,\, 7)$

2) $(c,\, u,\, m)=(3,\, 5,\, 7)$

3) $(c,\, u,\, m)=(3,\, 6,\, 6)$

4) $(c,\, u,\, m)=(4,\, 4,\, 7)$

5) $(c,\, u,\, m)=(4,\, 5,\, 6)$

6) $(c,\, u,\, m)=(5,\, 5,\, 5)$

Since the number of ways to choose k committee members from n delegates is $\binom{n}{k}$, we can calculate the number of ways to choose delegates. Therefore, the number of ways is

$$\binom{22}{2}\binom{25}{6}\binom{28}{7}+\binom{22}{3}\binom{25}{5}\binom{28}{7}+\binom{22}{3}\binom{25}{6}\binom{28}{6}+\binom{22}{4}\binom{25}{4}\binom{28}{7}$$
$$+\binom{22}{4}\binom{25}{5}\binom{28}{6}+\binom{22}{5}\binom{25}{5}\binom{28}{5}.$$