

第1題.

(a) 2^{10} #

(b) $C_3^{10} = \frac{10 \cdot 9 \cdot 8}{3 \cdot 2 \cdot 1} = 120$ #

(c) at least three \Rightarrow total - 2正 - 1正 - 0正

$$= 2^{10} - C_2^{10} - C_1^{10} - C_0^{10} = 1024 - 45 - 10 - 1 = 968$$
 #

(d) $C_5^{10} = \frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 252$ #

第2題.

$$8! \times C_5^9 \times 5! = 504 \times 42 \times 28800 = 609638400$$

第3題.

$$\frac{18!}{1!4!3!1!2!3!2!2!} \#$$

第4題.

$$\frac{14!}{2!7!5!2!} \#$$

第5題.

$$\begin{aligned}
 (a)-1 &: 9 \text{ 個} \\
 (a)-2 &: 6, 9, 12, 15, 18, 21, 24, 27, 30 \\
 (b)-1 &: 6 \text{ 個} \\
 (b)-2 &: 5, 10, 15, 20, 25, 30 \\
 (c)-1 &: 2 \text{ 個} \\
 (c)-2 &: 15, 30
 \end{aligned}$$

第6題.

$$\left\lceil \frac{677}{39} \right\rceil = 18 \# \\
 \min N = 18$$

第7題.

$${}^{12}C_7 \times {}^9C_1 \times {}^5C_1 = \frac{12 \cdot 11 \cdot 10 \cdot 9 \cdot 8}{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 792 \#$$

第8題.

$$\begin{aligned}
 (a) \quad x_i \geq 1 &\Rightarrow x_1 + x_2 + x_3 + x_4 + x_5 = 19 \Rightarrow C_{19}^{23} = \frac{23 \cdot 22 \cdot 21 \cdot 20}{4 \cdot 3 \cdot 2 \cdot 1} = 1771 \# \\
 (b) \quad x_i \geq 2 \text{ for } i = 1, 2, 3, 4, 5 &\Rightarrow x_1 + x_2 + x_3 + x_4 + x_5 = 10 \Rightarrow C_{10}^{14} = 1001 \# \\
 (c) \quad x_1 = 0 &\Rightarrow C_{20}^{23} \\
 x_1 = 1 &\Rightarrow C_{19}^{22} \\
 x_1 = 2 &\Rightarrow C_{18}^{21} \\
 x_1 = 3 &\Rightarrow C_{17}^{20} \\
 x_1 = 4 &\Rightarrow C_{16}^{19} \\
 x_1 = 5 &\Rightarrow C_{15}^{18} \\
 x_1 = 6 &\Rightarrow C_{14}^{17} \\
 x_1 = 7 &\Rightarrow C_{13}^{16} \\
 x_1 = 8 &\Rightarrow C_{12}^{15} \\
 \text{total} &= C_{20}^{23} + C_{19}^{22} + C_{18}^{21} + C_{17}^{20} + C_{16}^{19} + C_{15}^{18} + C_{14}^{17} + C_{13}^{16} + C_{12}^{15} \#
 \end{aligned}$$