Fermat's Wristband

(a) k^p different ways.

(b) $k^p - k$.

(c) $\frac{k^p-k}{p}$.

(d) $\frac{k^p-k}{p}$ count the non-equivalent ways to construct the wristband, the it must be an positive interger.

$$\begin{aligned} \frac{k^p - k}{p} &= n, n \in \mathbb{N} \\ k^p - k &= np \\ k^p &\equiv k \mod p \end{aligned}$$

Hence we get the FLT.

Counting, Counting, and More Counting

(a) $\binom{n+k}{k}$.

(b) 3×2^6.

(c)

$$\binom{52}{13} \tag{1}$$

$$\binom{48}{13} \tag{2}$$

$$\binom{48}{9} \tag{3}$$

$$\binom{13}{6} \cdot \binom{39}{7} \tag{4}$$

(d) $\frac{104!}{2^{52}}$.

(e) $\binom{99}{45} \cdot 2^{44}$.

(f)

$$\frac{7!}{4!} \tag{5}$$

$$\frac{7!}{2! \cdot 2!} \tag{6}$$

(g)

$$5! \tag{7}$$

$$\frac{6!}{2!} \tag{8}$$

(h) 27^9.

(i) $\binom{26+9}{9}$.

(j) $\binom{8}{2}$.

(k) $\prod_{i=1}^{10}(2i-1)$;

$\frac{20!}{10!\cdot 2^{10}}$.