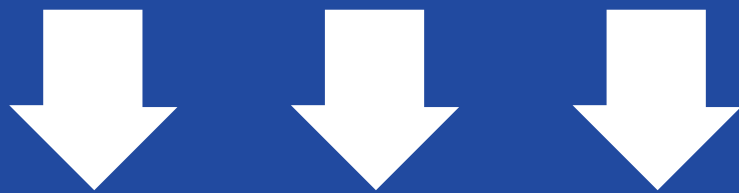


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TLE

Technologique Mathématiques

Bernoulli & binomiale



CORRIGÉ DE L'EXERCICE

FACTORIELLE

2

CORRECTION

Simplifier les expressions comportant la notion de factorielle:

On rappelle que pour $n \geq 0$: $n! = n \times (n-1) \times (n-2) \times \dots \times 2 \times 1$.

1. Pour $n \geq 2$, on a:

$$A = \frac{n!}{(n-2)!} = \frac{n \times (n-1) \times (n-2)!}{(n-2)!} = n \times (n-1).$$

$$\text{Ainsi: } \frac{n!}{(n-2)!} = n \times (n-1).$$

2. Pour $n \geq 1$, on a:

$$B = \frac{(n-1)!}{(n+2)!} = \frac{(n-1)!}{(n+2) \times (n+1) \times n \times (n-1)!} = \frac{1}{(n+2) \times (n+1) \times n}.$$

$$\text{Ainsi: } \frac{(n-1)!}{(n+2)!} = \frac{1}{(n+2) \times (n+1) \times n}.$$

3. Pour $n \geq 1$, on a:

$$\begin{aligned}
 C &= \frac{n!}{(n+1)!} - \frac{(n-1)!}{n!} = \frac{n!}{(n+1) \times n!} - \frac{(n-1)!}{n \times (n-1)!} \\
 &= \frac{1}{n+1} - \frac{1}{n} \\
 &= \frac{n - (n+1)}{n \times (n+1)} \\
 &= -\frac{1}{n \times (n+1)}.
 \end{aligned}$$

Ainsi:
$$\frac{n!}{(n+1)!} - \frac{(n-1)!}{n!} = -\frac{1}{n \times (n+1)}.$$