Exemples de mises en forme d'équations mathématiques

$$\lim_{x\to 0, x>0} \frac{\sqrt{x^2}}{x} = \lim_{\substack{x\to 0\\ x>0}} \frac{|x|}{x} = 1$$

(amsmath)

$$\begin{vmatrix} a+b & ab & 0 & 0 & 0 & \cdots & 0 & 0 \\ 1 & a+b & ab & 0 & 0 & \cdots & 0 & 0 \\ 0 & 1 & a+b & ab & 0 & \cdots & 0 & 0 \\ \hdotsfor{8} \\ 0 & 0 & 0 & 0 & 0 & \cdots & 1 & a+b \end{vmatrix} = \frac{a^{n+1}-b^{n+1}}{a-b}$$

(amsmath)

$$\det \begin{pmatrix} 1 & 2 & 1 & 3 \\ 2 & -1 & 0 & -2 \\ -1 & 1 & -1 & 1 \\ 0 & 1 & 0 & 2 \end{pmatrix} = 4 \quad \text{et} \quad \operatorname{tr} \begin{pmatrix} 1 & 2 & 1 & 3 \\ 2 & -1 & 0 & -2 \\ -1 & 1 & -1 & 1 \\ 0 & 1 & 0 & 2 \end{pmatrix} = 1$$

(amsmath et mathtools)

Le volume d'une sphère de rayon 1 dans l'espace euclidien de dimension n est

$$V_n = \begin{cases} \dfrac{\pi^k}{k!} & \text{si } n = 2k \\ 2^{2k+1}\dfrac{k!}{(2k+1)!}\pi^k & \text{si } n = 2k+1 \end{cases}$$

et sa surface vaut

$$S_n = \begin{cases} \dfrac{2\pi^k}{(k-1)!} & \text{si } n = 2k \\ 2^{2k+1}\dfrac{k!}{(2k)!}\pi^k & \text{si } n = 2k+1 \end{cases}$$

(amsmath et/ou mathtools)

$$\begin{cases} x = r\cos(\theta) \\ y = r\sin(\theta) \end{cases} \quad \text{et} \quad \begin{cases} r = \sqrt{x^2+y^2} \\ \theta = \arctan(y/x) \end{cases}$$

(amsmath)

$$
\begin{aligned}
\sqrt{2} &= 1 + \sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{2^{2n}(2n-1)} \binom{2n}{n} \\
&= \left[1 + \sum_{n=1}^{\infty} \frac{(-1)^n}{2^{2n}} \binom{2n}{n} \right]^{-1} \\
&= \prod_{n=1}^{\infty} \left(1 + \frac{(-1)^{n+1}}{2n-1} \right)
\end{aligned}
$$

ce qui vaut finalement

$$
= 2 + \cfrac{1}{2 + \cfrac{1}{2 + \cfrac{1}{2 + \cdots}}}
$$

(amsmath,mathtools)

$$
\int x^m (ax+b)^n dx = \begin{cases} \dfrac{x^{m+1}(ax+b)^n}{m+n+1} + \dfrac{nb}{m+n+1} \displaystyle\int x^m (ax+b)^{n-1} dx \\ \dfrac{x^m (ax+b)^{n+1}}{(m+n+1)a} - \dfrac{mb}{(m+n+1)a} \displaystyle\int x^{m-1} (ax+b)^n dx \\ \dfrac{-x^{m+1}(ax+b)^{n+1}}{(n+1)b} + \dfrac{m+n+2}{(n+1)b} \displaystyle\int x^m (ax+b)^{n+1} dx \end{cases}
$$

(amsmath)

Pour tout $r \in \mathbb{C}$ on a

$$
\begin{multline}
\pi = \sum_{k=0}^{\infty} \frac{1}{16^k} \times \\
\times \left(\frac{4+8r}{8k+1} - \frac{8r}{8k+2} - \frac{4r}{8k+3} - \frac{2+8r}{8k+4} - \frac{1+2r}{8k+5} - \frac{1+2r}{8k+6} + \frac{r}{8k+7} \right)
\end{multline}
$$

(amsmath)

$$
\begin{aligned}
x^{2n+1} - y^{2n+1} &= (x-y)(x^{2n} + x^{2n-1}y + x^{2n-2}y^2 + \cdots + y^{2n}) \\
&= (x-y)\left(x^2 - 2xy\cos\frac{2\pi}{2n+1} + y^2\right) \times \\
&\qquad \times \left(x^2 - 2xy\cos\frac{4\pi}{2n+1} + y^2\right) \cdots \\
&\qquad\qquad \cdots \left(x^2 - 2xy\cos\frac{2n\pi}{2n+1} + y^2\right)
\end{aligned}
$$

(amsmath et mathtools)

$$
\begin{aligned}
f(x+h, y+k) = f(x,y) \; &+ \left\{ h\frac{\partial f(x,y)}{\partial x} + k\frac{\partial f(x,y)}{\partial y} \right\} \\
&+ \frac{1}{2!}\left\{ h^2\frac{\partial^2 f(x,y)}{\partial x^2} + 2hk\frac{\partial^2 f(x,y)}{\partial x \partial y} + k^2\frac{\partial^2 f(x,y)}{\partial y^2} \right\} \\
&+ \frac{1}{3!}\left\{ h^3\frac{\partial^3 f(x,y)}{\partial x^3} + 3h^2k\frac{\partial^3 f(x,y)}{\partial x^2 \partial y} + 3hk^2\frac{\partial^3 f(x,y)}{\partial x \partial y^2} \right. \\
&\qquad\qquad\qquad\qquad\qquad\qquad\qquad \left. + k^3\frac{\partial^3 f(x,y)}{\partial y^3} \right\} \\
&+ \cdots
\end{aligned}
$$

(amsmath et mathtools)

$$
\begin{aligned}
&\int \frac{\sin^m x}{\cos^n x}\frac{dx}{x} \\
&\quad = \frac{\sin^{m+1} x}{(n-1)\cos^{n-1} x} - \frac{m-n+2}{n-1}\int \frac{\sin^m x}{\cos^{n-2} x}\frac{dx}{x}, &&\text{pour } n \neq 1, \\
&\quad = -\frac{\sin^{m-1} x}{(m-n)\cos^{n-1} x} - \frac{m-1}{m-n}\int \frac{\sin^{m-2} x}{\cos^n x}\frac{dx}{x}, &&\text{pour } m \neq n, \\
&\quad = \frac{\sin^{m-1} x}{(n-1)\cos^{n-1} x} - \frac{m-1}{n-1}\int \frac{\sin^{m-2} x}{\cos^{n-2} x}\frac{dx}{x}, &&\text{pour } n \neq 1.
\end{aligned}
$$

(amsmath et mathtools)

Avec $k' = \sqrt{1-k^2}$ on a

$$\begin{aligned}
&\int_0^{\pi/2} \sqrt{1-k^2\sin^2\varphi}\, d\varphi \\
&\qquad\qquad = 1 + \frac{1}{2}\left(\ln\frac{4}{k'} - \frac{1}{1{\cdot}2}\right)k'^2 \\
&\qquad\qquad\quad + \frac{1^2{\cdot}3}{2^2{\cdot}4}\left(\ln\frac{4}{k'} - \frac{2}{1{\cdot}2} - \frac{1}{3{\cdot}4}\right)k'^4 \\
&\qquad\qquad\quad + \frac{1^2{\cdot}3^2{\cdot}5}{2^2{\cdot}4^2{\cdot}6}\left(\ln\frac{4}{k'} - \frac{2}{1{\cdot}2} - \frac{2}{3{\cdot}4} - \frac{1}{5{\cdot}6}\right)k'^6 + \cdots
\end{aligned}$$

(amsmath et mathtools)

$$\begin{aligned}
(d\omega)(X_1,\ldots,X_{n+1}) &= \sum_{i=1}^{n+1}(-1)^{i+1}X_i{\cdot}\omega(X_1,\ldots\overset{i}{\vee}\ldots X_{n+1}) \\
&\qquad \sum_{1\le i<j\le n+1}(-1)^{i+j}\omega([X_i,X_j],X_1,\ldots\overset{i}{\vee}\ldots\overset{j}{\vee}\ldots,X_{n+1})
\end{aligned}$$

(amsmath)

$$\begin{aligned}
2! &= 2\\
3! &= 6\\
4! &= 24\\
5! &= 120\\
6! &= 720\\
7! &= 5\,040\\
8! &= 40\,320\\
9! &= 362\,880\\
10! &= 3\,628\,800\\
11! &= 39\,916\,800
\end{aligned}$$

(amsmath et numprint)