Basic Typesetting with Groff

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ABSTRACT

Mathematical typesetting in professional settings is typically done through either LaTeX/TeX or Word[1]. However, there is a simple and free way to make professional looking documents with tables, mathematical symbols, and chemical equations that is installed by default on all *nix systems (macOS, Linux, BSD). The program groff can beautifully typeset documents in a fashion superior to most widely used document creation programs.

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[1] Word is a registered trademark of Microsoft Corporation®.

1. Mathematical Typesetting

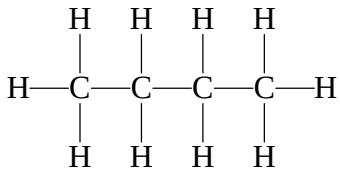
Below are a few famous equations rendered in groff. The equivalent LaTeX and Word versions for these would be made much more difficult. Mathematical equations in groff are rendered through the groff companion program eqn. The table is created through the groff companion program tbl.

Famous Equations	
Pythagorean Theorem	$c = \sqrt{a^2 + b^2}$
Sigma	$\lim_{N \to \infty} \sum_{k=1}^{N} k^2$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Newton's First Law	$\sum F = 0 \Leftrightarrow \frac{dv}{dt} = 0$
Newton's Second Law	$\sum F = ma$
Newton's Third Law	$F_A = -F_B$
Golden Ratio	$\phi = \frac{1 + \sqrt{5}}{2} = 1.6180339887\ldots.$
Fourier Transform	$F(\frac{k}{N}\Delta t) = \sum_{j=0}^{N} -1 f(j\Delta t) e^{-\frac{i2\pi jk}{N}} \quad n = 0, 1, \ldots, N-1$
Einstein Field Equations	$G_{\mu\nu} + \lambda g_{\mu\nu} = \kappa T_{\mu\nu}$
Definite Integral	$\int_a^b f(x)dx.$
Legendre Function	$P_{n,m}(\cos\theta) = \frac{1}{2^n n!} (t - t^{2)^{m/2}} \frac{d^{n+m}}{dt^{n+m}} (t^2 - 1)^n$
Navier-Stokes Equations	$\rho(\frac{\partial u}{\partial t} + u \cdot \nabla u) = -\nabla_p + \nabla \cdot T_D + f$
Simple Matrix	$A = \begin{bmatrix} 0 & -1 & -2 & -3 \\ 1 & 0 & -1 & -2 \\ 2 & 1 & 0 & -1 \end{bmatrix}$
Discrete Masses	$I = \sum_i m_i \cdot r_i = \sum_i \lvert r_i \rvert^2 m$
Low Amplitude Simple Pendulum	$\omega = \sqrt{\frac{g}{L}} \left[1 + \sum_{k=1}^{\infty} \frac{\prod_{n=1}^{k} 2n-1}{\prod_{n=1}^{m} 2n} \sin^{2n}\Theta \right]$
Gravitomagnetic Field	$\xi = \frac{G}{2c^2} \frac{L3(L \cdot \hat{r})\hat{r}}{\lvert r \rvert^3}$
Tsiolkovsky rocket equation	$\Delta v = v_e \ln \frac{m_0}{m_f} = I_{sp} g_0 \ln \frac{m_0}{m_f}$

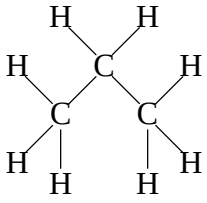
2. Chemical Typesetting

Below are a few chemical equations that demonstrate the capabilities of groff's companion program chem.

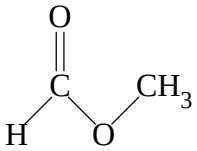
2.1. Butane C_4H_{10}



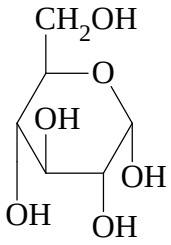
2.2. Propane C_3H_8



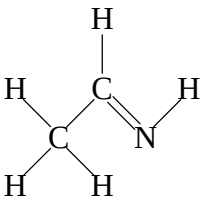
2.3. Methyl Formate $C_2H_4O_2$



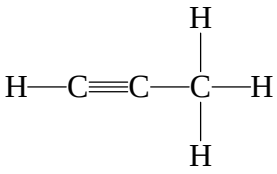
2.4. Glucose $C_6H_{12}O_6$



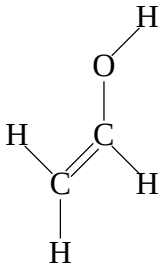
2.5. Ethanimine C_2H_5N



2.6. Methylacetylene C_3H_4



2.7. Ethenol CH_2CHOH



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