

Evaluating a Formula like in a Textbook

[-] Evals

- Sintaxis**
- $Evals(eq, values, n, u)$ Try to show eq at values with n decimals in the unit u as in a textbook.
 - $Evals(eq, values, n)$ For equations without units
 - $Evals(eq, values)$ Uses the decimals in the values, with a maximum of 6 (n=-1).
 - $Evals(v, eq, values, n, u)$ Assign to v the result of the equation.

- For specify units in values, use ~ as first character, instead'
- If the equation have constants with decimals, mask it with v2s
- The order of the values is the lexical order, given by Unknows(eq)

Example $E := Evals\left(\frac{a \cdot c + b \cdot \cos(c)}{c^2 + v2s(500.37)}, \left[194400 \ 44640 \ \frac{5 \cdot \pi}{12}\right]\right)$ Using maximum 6 decimals

$$E = \left[\frac{a \cdot c + b \cdot \cos(c)}{500.37 + c^2} = \frac{194400 \cdot 1.308997 + 44640 \cdot \cos(1.308997)}{500.37 + 1.308997^2} = \frac{266022.696343}{502.083473} = 529.837588 \right]$$

Example $E := Evals\left(\frac{a \cdot c + b \cdot \cos(c)}{c^2 + v2s(500.37)}, \left[194400 \ 44640 \ \frac{5 \cdot \pi}{12}\right], 3\right)$ Using 3 decimals for all numbers in values.

$$E = \left[\frac{a \cdot c + b \cdot \cos(c)}{500.370 + c^2} = \frac{194400.000 \cdot 1.309 + 44640.000 \cdot \cos(1.309)}{500.370 + 1.309^2} = \frac{266023.150}{502.083} = 529.838 \right]$$

Example If the output is too long, it could be arranged into a table. Conversion factors use 6 decimals.

$$E := Evals\left(\frac{a \cdot c + b \cdot \cos(c)}{c^2 + v2s(500.37)}, \left[0.18 \cdot \frac{\text{in}}{\text{s}^2} \ 12.4 \cdot \frac{\text{ft}}{\text{min}^2} \ 75 \cdot \text{deg}\right], 3, \frac{\text{ft}}{\text{hr}^2}\right)$$

$\frac{a \cdot c + b \cdot \cos(c)}{500.370 + c^2}$ $= \frac{0.180 \cdot \text{in} \cdot 75.000 \cdot \text{deg} \cdot \text{min}^2 + 12.400 \cdot \text{ft} \cdot \cos(75.000 \cdot \text{deg}) \cdot \text{s}^2}{\text{min}^2 \cdot \text{s}^2 \cdot (500.370 + 75.000^2 \cdot \text{deg}^2)}$ $= \frac{0.180 \cdot 0.0254 \cdot 75.000 \cdot 0.017453 \cdot 60^2 + 12.400 \cdot 0.3048 \cdot \cos(75.000 \cdot 0.017453)}{60^2 \cdot (500.370 + 75.000^2 \cdot 0.017453^2)} \cdot \frac{12960000}{0.3048} \cdot \frac{\text{ft}}{\text{hr}^2}$ $= 529.838 \cdot \left[\frac{\text{ft}}{\text{hr}^2} \right]$
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stack([[" " E₁ " "], [E₂ E₃ " "], [E₄ E₅ E₆ E₇], [E₈ E₉ · [E₁₀] " "]])

Example $E := Evals\left(\frac{2 \cdot m_1 \cdot m_2}{m_1 + m_2} \cdot g_e, \left[9.8 \cdot \frac{\text{m}}{\text{s}} \ 17.3 \cdot \text{lb} \ 12.4 \cdot \text{lb}\right], 2, \text{lbf}\right)$

$$E = \left[\frac{2 \cdot m_1 \cdot m_2 \cdot g_e}{m_1 + m_2} = \frac{2 \cdot 17.30 \cdot \text{lb} \cdot 12.40 \cdot 9.80 \cdot \text{m}}{(17.30 + 12.40) \cdot \text{s}^2} = \frac{2 \cdot 17.30 \cdot 0.453592 \cdot 12.40 \cdot 9.80}{17.30 + 12.40} \cdot \frac{1}{4.448222} \text{lbf} = 14.44 \text{lbf} \right]$$

$$\frac{2 \cdot m_1 \cdot m_2 \cdot g_e}{m_1 + m_2} = \frac{2 \cdot 17.30 \cdot \mathbf{lb} \cdot 12.40 \cdot 9.80 \cdot \mathbf{m}}{(17.30 + 12.40) \cdot \mathbf{s}^2} = \frac{2 \cdot 17.30 \cdot 0.453592 \cdot 12.40 \cdot 9.80}{17.30 + 12.40} \frac{1}{4.448222} \mathbf{lbf} = 14.44 \mathbf{lbf}$$

E

Example For the 5 args version, first argument is the variable name to be assigned the result.

$$v_2 = \frac{a \cdot c + b \cdot \cos(c)}{500.370 + c^2} = \frac{194400.000 \cdot 1.309 + 44640.000 \cdot \cos(1.309)}{500.370 + 1.309^2} = \frac{266023.150}{502.083} = 529.838$$

Symbolic

Evals $\left(v_2, \frac{a \cdot c + b \cdot \cos(c)}{c^2 + v_2 s(500.37)} \right), \left[194400 \ 44640 \ \frac{5 \cdot \pi}{12} \right], 3, 1$

$v_2 = 529.838$ Numerical

$E := \text{Evals} \left(T, \frac{2 \cdot m_1 \cdot m_2}{m_1 + m_2} \cdot g_e, \left[9.81 \cdot \frac{\mathbf{m}}{\mathbf{s}^2} \ 17.3 \cdot \mathbf{lb} \ 12.4 \cdot \mathbf{lb} \right], 2, \mathbf{lbf} \right)$

$T = 14.45 \mathbf{lbf}$

$$\begin{aligned} T &= \frac{2 \cdot m_1 \cdot m_2 \cdot g_e}{m_1 + m_2} \\ &= \frac{2 \cdot 17.30 \cdot \mathbf{lb} \cdot 12.40 \cdot 9.81 \cdot \mathbf{m}}{(17.30 + 12.40) \cdot \mathbf{s}^2} \\ &= \frac{2 \cdot 17.30 \cdot 0.453592 \cdot 12.40 \cdot 9.81}{17.30 + 12.40} \frac{1}{4.448222} \mathbf{lbf} \\ &= 14.45 \cdot [\mathbf{lbf}] \end{aligned}$$

stack $\left([\text{"" } E_1 \text{ "" ""}], [E_2 E_3 \text{ "" ""}], [E_4 E_5 E_6 E_7], [E_8 E_9 \cdot [E_{10} \text{ "" ""}]] \right)$ Clear(T) = 1

Example Using uncertainties in the values: g.e is assuming exact, meanwhile the masses have errors.

$E := \text{Evals} \left(T, \frac{2 \cdot m_1 \cdot m_2}{m_1 + m_2} \cdot g_e, \left[9.81 \cdot \frac{\mathbf{m}}{\mathbf{s}^2} (17.3 \pm 0.1) \cdot \mathbf{lb} (12.4 \pm 0.2) \cdot \mathbf{lb} \right], 1, \mathbf{lbf} \right)$

$T = \begin{cases} 14.6 \\ 14.3 \end{cases} \mathbf{lbf}$

$$\begin{aligned} T &= \left(\frac{2 \cdot m_1 \cdot m_2 \cdot g_e}{m_1 + m_2} \right) + \pm \left(\left| \frac{2 \cdot m_2^2 \cdot g_e}{(m_1 + m_2)^2} \right| \cdot \Delta m_1 + \left| \frac{2 \cdot m_1^2 \cdot g_e}{(m_1 + m_2)^2} \right| \cdot \Delta m_2 \right) \\ &= \left(\frac{2 \cdot 17.3 \cdot \mathbf{lb} \cdot 12.4 \cdot 9.8 \cdot \mathbf{m}}{(17.3 + 12.4) \cdot \mathbf{s}^2} \right) + \pm \left(\mathbf{lb} \cdot \left(\left| \frac{2 \cdot 12.4^2 \cdot 9.8 \cdot \mathbf{m}}{(17.3 + 12.4)^2 \cdot \mathbf{s}^2} \right| \cdot 0.1 + \left| \frac{2 \cdot 17.3^2 \cdot 9.8 \cdot \mathbf{m}}{(17.3 + 12.4)^2 \cdot \mathbf{s}^2} \right| \cdot 0.2 \right) \right) \\ &= \left(\frac{2 \cdot 17.3 \cdot 0.453592 \cdot \mathbf{kg} \cdot 12.4 \cdot 9.8 \cdot \mathbf{m}}{(17.3 + 12.4) \cdot \mathbf{s}^2} \right) + \pm \left(0.453592 \cdot \mathbf{kg} \cdot \left(\left| \frac{2 \cdot 12.4^2 \cdot 9.8 \cdot \mathbf{m}}{\mathbf{s}^2 \cdot (17.3 + 12.4)^2} \right| \cdot 0.1 + \left| \frac{2 \cdot 17.3^2 \cdot 9.8 \cdot \mathbf{m}}{\mathbf{s}^2 \cdot (17.3 + 12.4)^2} \right| \cdot 0.2 \right) \right) \cdot \mathbf{s}^2 \\ &= \frac{\mathbf{kg} \cdot \mathbf{m}}{4.448222} \mathbf{lbf} \\ &= 14.6 \cdot \mathbf{lbf} \\ &= 14.3 \cdot \mathbf{lbf} \end{aligned}$$

Alvaro

appVersion(4) = "1.0.8348.30405"