Evaluating a Formula like in a Texbook

Ev - mathcad block

```
Ev(n#):= | N#(x#):= | try
                      |   str2num(strrep("num2str(x#,"N")", "N", concat("n", num2str(n#))))
                      | on error
                      |   x#
         | S#(x#):= | strrep(concat("S:", num2str(x#)), "'", "'")
         | E#(x#, r#):= | strrep(num2str(strsplit(num2str(x#), "≡")[r#]), """", "")
         | [k(x#):= |  (N#(x#)) V#:= stack(eq, 1)]
         | str2num(concat(strrep(num2str(Unknowns(eq)), "mat(", "Clear(")))
         | Q#:= str2num(strrep(strrep(num2str(eq), ":", "≡"), "'", "'"))
         | for v# ∈ Unknowns(eq)
         |   Q#:= str2num(concat("equrep(Q#,", num2str(v#), ", ", num2str(v#), ")"))
         | if num2str(findstr(num2str(Unknowns(eq)), "unit")) = "-1"
         |   Q#[length(Q#)+1 := ("unit≡1")
         | [q#:= length(Q#) E#:= num2str(Q#[q#-1) R#:= E#(E#, 2)]
         | for k# ∈ [1..(q#-2)]
         |   R#:= strrep(R#, E#(Q#[k#, 1), N#(str2num(E#(Q#[k#, 2))))
         | [A#:= S#(E#) B#:= S#(R#) u#:= S#(E#(Q#[q#, 2)))  (x#):= | str2num(x#)]
         | [strrep(A#, """", "") "=" B# "=" N#(V#[q#-1 / str2num(u#)) { "" if num2str(u#) = "S:1"
         |                                                             { u# otherwise ]
```

$k(x) := x$ use k for mask constants with decimals

$$a := 194400 \quad b := 44640 \quad c := \frac{5 \cdot \pi}{12}$$

$$t := \frac{a \cdot c + b \cdot \cos(c)}{c^2 + k(500.37)}$$

eq

$$t = \frac{a \cdot c + b \cdot \cos(c)}{c^2 + (500.37)} = \frac{1.94 \cdot 10^5 \cdot 1.31 + 44640 \cdot \cos(1.31)}{1.31^2 + (500.37)} = 529.84$$

Ev(2)

$$m_1 := \frac{10}{3}\ \text{kg} \quad m_2 := \frac{5}{2}\ \text{lb}$$

$$T := \frac{2 \cdot m_1 \cdot m_2}{m_1 + m_2}\ g_e \qquad unit := \text{kgf}$$

$T = 1.692$ kgf

eq

$$T := \frac{2 \cdot m_1 \cdot m_2 \, g_e}{m_1 + m_2} = \frac{2 \cdot 3.333\ \text{kg} \cdot 2.5\ \text{lb}\ g_e}{3.333\ \text{kg} + 2.5\ \text{lb}} = 1.692\ \text{kgf}$$

Ev(3)

$m_1 := \frac{10}{3}\ \text{kg} \qquad m_2 := \frac{5}{2}\ \text{lb} \qquad g := 9.8\ \frac{\text{m}}{\text{s}^2}$

$T := 2 \cdot \frac{m_1 \cdot m_2}{m_1 + m_2} \cdot g \qquad unit := \text{kgf}$

$T = 1.691\ \text{kgf}$

$$T := \frac{2 \cdot m_1 \cdot m_2 \cdot g}{m_1 + m_2} = \frac{2 \cdot 3.333\ \text{kg} \cdot 2.5\ \text{lb} \cdot 9.8\ \frac{\text{m}}{\text{s}^2}}{3.333\ \text{kg} + 2.5\ \text{lb}} = 1.691\ \text{kgf}$$

eq

$$\delta := \frac{A \cdot \cos(\theta)}{e^{k \cdot t}} = \frac{4.1\ \text{ft} \cdot \cos(45\ °)}{e^{2.4\ \text{Hz} \cdot 0.1\ \text{s}}} = 27.36651\ \text{in}$$

$\delta = 27.36651\ \text{in}$

eq

$$q := \frac{P}{L \cdot B} = 500\ \frac{\text{kgf}}{5.34\ \text{m} \cdot 2.5\ \text{ft}} = 1.21\ \text{kPa}$$

$q = 1.21\ \text{kPa}$

$\alpha := 3 \qquad \beta := 4$

$\kappa := \frac{1}{4} \cdot \gamma \cdot \sqrt{\alpha^2 + \beta^2}$

$\kappa = \frac{\gamma \cdot \sqrt{25}}{4}$

$$\kappa := \frac{\gamma \cdot \left(\alpha^2 + \beta^2\right)^{\frac{1}{2}}}{4} = \frac{\gamma \cdot \left(3^2 + 4^2\right)^{\frac{1}{2}}}{4} = \frac{\gamma \cdot 25^{\frac{1}{2}}}{4}$$

Alvaro

appVersion(4) = "1.1.8763.0"