Example 14.mcdx -- Example 1.4 from Schaum's Outline Series, Theory and Problems of Thermodynamics (Calculated using Math Prime 8.0.0.0)

$$R := 8314 \cdot \frac{J}{kg \cdot mol \cdot K} \qquad T := 300 \cdot K$$

$$V1 := 1 \cdot m^3 \qquad V2 := 10 \cdot m^3$$

$$W := R \cdot T \cdot \int_{V1}^{V2} \frac{1}{V} dV \qquad T = 300\ K$$

$$W = \left(5.743 \cdot 10^3\right)\ kg \cdot \frac{J}{kg \cdot mol}$$

This is off by a factor of 1000 and the units are not correct, i.e. the first "kg" should not be present.

$$R = \left(8.314 \cdot 10^3\right) \frac{1}{K} \cdot \frac{J}{kg \cdot mol}$$

$$R \cdot T \cdot \ln(10) = \left(5.743 \cdot 10^6\right) \frac{J}{kg \cdot mol}$$

This is the correct value and the correct units.

$$\int_{V1}^{V2} \frac{1}{V} dV = 2.303 \qquad \ln(10) = 2.303$$

This is just to show that ln (10) has the same value as the integral.