HOMEWORK SET 17: MAXWELL-BOLTZMANN SPEED DISTRIBUTIONS
Due Wednesday, March 26, 2025

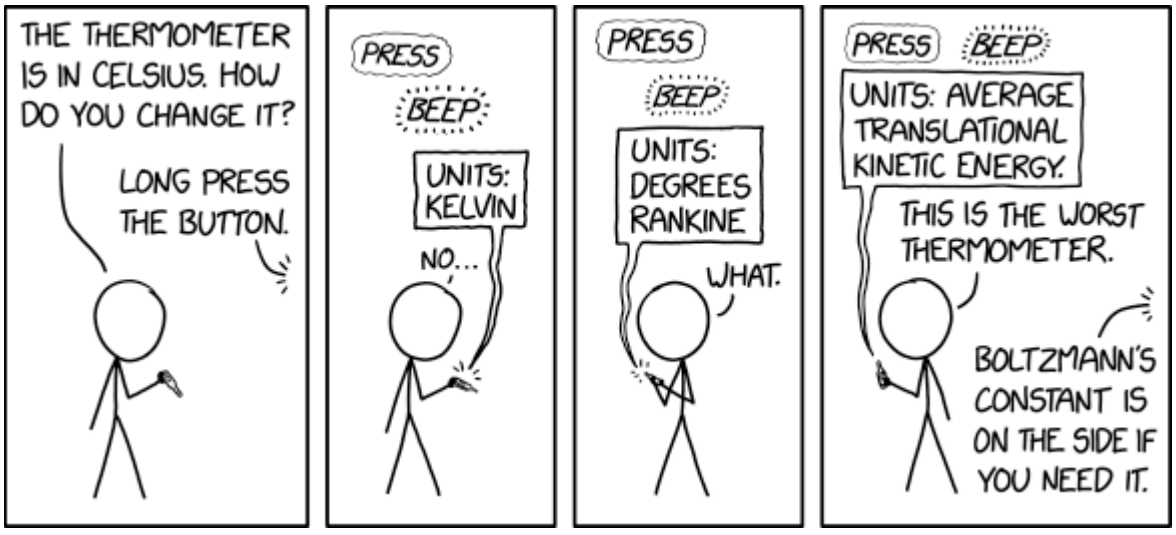
PROBLEMS FROM TREX[1]

9.1) **a)** Use Equation (9.5), $g(v_x)dv_x = \left(\frac{\beta m}{2\pi}\right)^{1/2} e^{-\frac{1}{2}\beta m v_x^2} dv_x$ to show that the one dimensional rms speed is

$$v_{rms} = \sqrt{v^2} = \left(\frac{kT}{m}\right)^{1/2}$$

b) Show that Equation (9.5) can be rewritten as

$$g(v_x)dv_x = \sqrt{\frac{1}{2\pi}}\frac{1}{v_{x,rms}} e^{-\frac{1}{2}v_x^2/v_{x,rms}^2} dv_x$$



[1] Thornton and Rex, *Modern Physics for Scientists and Engineers*, 3rd Editon, Cengage Learning, 2013