Trex 9.2) Estimate the relative probabilities of various velocities usig the MB distribution. Take $\Delta v = 0.002v_{x,rms}$ for one mole of an ideal gas compute the number of molecules within v_x centered at

a) $v_x =$ 0.010 $v_{x,rms}$
b) $v_x =$ 0.200 $v_{x,rms}$
c) $v_x =$ 1.000 $v_{x,rms}$
d) $v_x =$ 5.000 $v_{x,rms}$
e) $v_x =$ 100.0 $v_{x,rms}$

$N_A =$ 6.02E+23

$$g(x)dx = \frac{1}{\sqrt{(2\pi)}\, v_{x,rms}} \text{EXP}\left(- \frac{(v_x)2}{2(v_{x,rms})^2} \right) dx$$

$$g(x)dx \approx \frac{1}{\sqrt{(2\pi)}} \text{EXP}\left(- \frac{(v_x/v_{x,rms})^2}{2} \right) 0.002$$

a) $(v_x/v_{x,rms})^2 =$ 0.0001

$$g(x)dx \approx \frac{1}{\sqrt{(2\pi)}} \text{EXP}\left(- \frac{(0.01)2}{2} \right) 0.002 = 7.979\text{E-}04$$

b) $(v_x/v_{x,rms})^2 =$ 0.0400

$$g(x)dx \approx \frac{1}{\sqrt{(2\pi)}} \text{EXP}\left(- \frac{(0.01)2}{2} \right) 0.002 = 7.821\text{E-}04$$

c) $(v_x/v_{x,rms})^2 =$ 1.0

$$g(x)dx \approx \frac{1}{\sqrt{(2\pi)}} \text{EXP}\left(- \frac{(0.01)2}{2} \right) 0.002 = 4.839\text{E-}04$$

d) $(v_x/v_{x,rms})^2 =$ 25

$$g(x)dx \approx \frac{1}{\sqrt{(2\pi)}} \text{EXP}\left(- \frac{(0.01)2}{2} \right) 0.002 = 2.973\text{E-}09$$

e) $(v_x/v_{x,rms})^2 =$ 10000

$$g(x)dx \approx \frac{1}{\sqrt{(2\pi)}} \text{EXP}\left(- \frac{(0.01)2}{2} \right) 0.002 = 0.00\text{E+}00$$