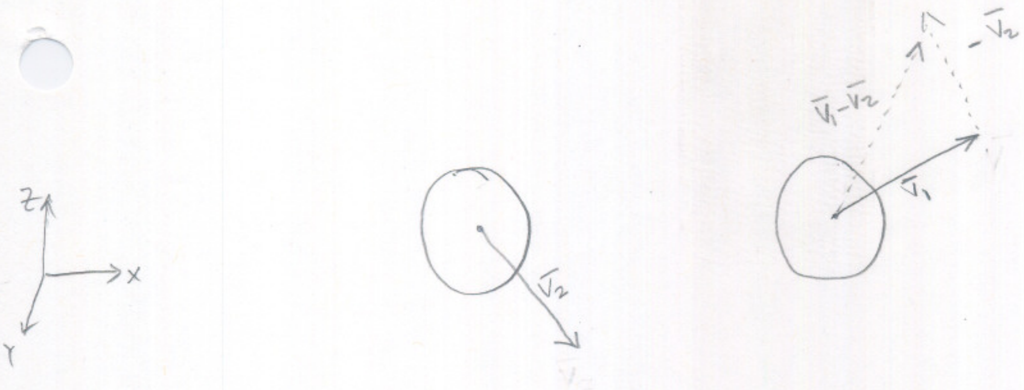
11.3 Nasser Abbasi

derive 11.18 , expression for average relative speed.

$\frac{12}{16}$



$$\langle |V_1 - V_2| \rangle = \int\int |V_1 - V_2| \; P_V(V_1) \; P_V(V_2) \; dV_1 \, dV_2$$

using spherical coordinates

$$P_V(V_1)\, dV_1 = P_V(v_1, \theta, \phi)\, v_1^2 \sin\theta \, dv_1 \, d\theta \, d\phi = A\left(e^{-\frac{1}{2}m v_1^2/KT} v_1^2 \, dv_1\right) \sin\theta \, d\theta \, d\phi$$

$$P_v(V_2)\, dv_2 = P_v(v_2, \theta, \phi)\, v_2^2 \sin\theta \, dv_2 \, d\theta \, d\phi = A\left(e^{-\frac{1}{2}m v_2^2/KT} v_2^2 \, dv_2\right) \sin\theta \, d\theta \, d\phi$$

Should I solve this in spherical coordinates or Cartesian?

11.9 gives

$$P_v(v)\, dv = 4\pi \left(\frac{m}{2\pi KT}\right)^{3/2} v^2 \, e^{-\frac{1}{2}m v^2/KT} \, dv$$

$\frac{1}{4}$

in the above v is scalar, not vector.

$$\int\int |V_1 - V_2| \, A\left(e^{-\frac{1}{2}m v_1^2/KT} v_1^2 \, dv_2\right)(\sin\theta_1 \, d\theta_1)\, d\phi_1 \; A\left(e^{-\frac{1}{2}m v_2^2/KT} v_2^2 \, dv_2\right) \sin\theta_2 \, d\theta_2 \, d\phi_2$$

I am sorry can't figure this. ☹

Can't win them all.
Probably still pass the course ☺