Parametrization of line is
blend between points

$$pos(t, p0, pM) := p0 \cdot (1 - t) + pM \cdot t$$

$$\frac{d}{dt} pos(t, p0, pM) \rightarrow pM - p0$$

arclength of a line between 2
pts

$$\int_0^1 |pM - p0| \, dt \rightarrow \sqrt{(pM - p0)^2}$$

$$\int_0^1 \left(\overrightarrow{pos(t, p0, pM)} \cdot y\right) \cdot \left| \frac{d}{dt} pos(t, p0, pM) \right| dt \rightarrow \frac{y \cdot (pM + p0) \cdot \sqrt{(pM - p0)^2}}{2}$$

$$h(p) := \|p\| - Rp$$

$$\frac{d}{dt} \overrightarrow{pos(t)} \rightarrow ?$$

Pv $fragDir$ $R := 70$ Rp Ha

$$Pve\_(Pv) := (0 - Pv) \cdot fragDir + \sqrt{R^2 - \|Pv + ((0 - Pv) \cdot fragDir) \cdot fragDir\|^2}$$

$$EndL(p, dir) := (0 - p) \cdot dir + \sqrt{R^2 - \|p + ((0 - p) \cdot dir) \cdot dir\|^2}$$

$$EndP(p, dir) := EndL(p, dir) \cdot dir + p$$

Calculation of endpoint for view ray

$$pLerp(t, p0, pM) := p0 \cdot (1 - t) + pM \cdot t$$

in final solution replace all squares with direct multiplication

$$ro(h) := Adens0 - \frac{h}{Ha} \cdot Adens0$$

$$scat(ro) := sk \cdot ro$$

$endlPv$
$endlPve$
$endpPv$
$endpPve$

$$vpoint(s) := pLerp(s, Pv, Pve)$$

$$Lendp(s) := pLerp(s, endpPv, endpPve)$$

$$scanLightPt(t, s) := pLerp(t, vpoint(s), Lendp(s))$$

$$RayAtmLen(s) := pLerp(s, endlPv, endlPve)$$

length of ray through atmosphere to v point

$$\int_0^1 ro\left(h\left(lrps\left(t,s\right)\right)\right)\cdot EndP\left(pLerp\left(s,Pv,Pve\right),toLdir\right)\,\mathrm{d}t \rightarrow \int_0^1 \left(-\frac{Adens0\cdot\left(\left|lrps\left(t,s\right)\right|-Rp\right)}{Ha}+Adens0\right)\cdot\left(toLdir\cdot\left(\sqrt{-\left(toLdir^4\cdot\left(-\left(\ldots\right.\right.\right.\right.\right.$$

$$\int_0^1 \left\|EndP\left(pLerp\left(s,Pv,Pve\right),toLdir\right)\right\|\cdot LmaxV\,\mathrm{d}s \rightarrow \int_0^1 LmaxV\cdot\left|toLdir\cdot\left(\sqrt{-\left(toLdir^4\cdot\left(-\left(Pv\cdot\left(1-s\right)\right)-Pve\cdot s\right)^2\right)+\left(2\cdot Pr\right.\right.\right.\right.\right.\ldots$$

$$H\left(s\right):=pLerp\left(s,0,Ha\right)\rightarrow Ha\cdot s$$

$$Hr\left(t,s\right):=pLerp\left(t,H\left(s\right),Ha\right)\rightarrow Ha\cdot s\cdot\left(-t+1\right)+Ha\cdot t$$

$$rayPowerLeft\left(s\right):=Light-Light\int_0^1 scat\left(ro\left(Hr\left(t,s\right)\right)\right)\cdot RayAtmLen\left(s\right)\,\mathrm{d}t$$

$$rayPowerToEye\left(s\right):=rayPowerLeft\left(s\right)\cdot scat\left(ro\left(H\left(s\right)\right)\right)$$

this is wrong because we should be loosing light at every point. integral should be multiplicative something. 3% *3%*3% and so on, instead of 3+3+3 (probably?)

those are two most important integrals
which approximate light that comes to eye.

$$\int_0^1 rayPowerToEye(s)\cdot LmaxV\,ds \rightarrow \frac{-(Adens0\cdot Light\cdot LmaxV\cdot sk\cdot((Adens0\cdot endlPve+3\cdot Adens0\cdot endlPv)\cdot sk-12))}{24}$$

$$\int_0^1 rayPowerLeft(s)\cdot LmaxV\,ds \rightarrow -\frac{Adens0\cdot Light\cdot LmaxV\cdot endlPve\cdot sk}{12}+\left(Light\cdot LmaxV-\frac{Adens0\cdot Light\cdot LmaxV\cdot endlPv\cdot sk}{6}\right)$$

$$\int_0^1\int_0^1 ro(h(scanLightPt(t,s)))\cdot Lendp(s)\,dt\cdot LmaxV\,ds \rightarrow ?$$

well lol mathcad still cant
deal with it

$$\int_0^1\int_0^1 ro(h(pLerp(t,pLerp(s,Pv,Pve),EndP(pLerp(s,Pv,Pve),toLdir))))\cdot\left|\frac{d}{dt}pLerp(t,pLerp(s,Pv,Pve),EndP(pLerp(s,Pv,Pve),toL\right.$$