Hello!
Here is some math.

$$\alpha\beta\gamma\delta\Gamma\Delta\Lambda\Theta abcdABCD$$

Now here are some symbols.

$$\int_{-\infty}^{\infty} \sin\theta = \sqrt{\frac{e^{i\pi}}{\sum_{i=0} \epsilon\Gamma\Lambda \cdot i}}$$

Here is a compatibility test. Lowercase letters:

$$\alpha a \beta b \gamma y \delta d \epsilon e \varepsilon \eta n \theta o \iota i \kappa k \lambda l \ell \mu u \nu v \rho p \sigma o \tau t \upsilon v \phi o \chi x \omega w$$

Uppercase letters:

$$\Gamma\mathrm{F}\Delta\mathrm{A}\Theta\mathrm{O}\Lambda\mathrm{A}\mathrm{T}\Xi\mathrm{E}\Sigma\mathrm{X}\Upsilon\mathrm{Y}\ \mathrm{O}\Phi\mathrm{I}\Psi\mathrm{U}\Omega\mathrm{O}$$

Large symbols, text-size:

$$\textstyle [(\langle\{\int S \sum E\}\rangle)$$

Display style:

$$\left[\left(\left\langle\left\{\int S \sum E\right\}\right\rangle\right)\right]$$

Common math symbols:

$$a + \frac{2}{\pi} \neq 15 \Longrightarrow A \in \Pi, \forall A \approx \nabla.$$

## Unbound Orbits: Deflection of Light by the Sun

Consider a particle or photon approaching the sun from very great distances. At infinity the metric is Minkowskian, that is, $A(\infty) = B(\infty) = 1$, and we expect motion on a straight line at constant velocity $V$

$$b \simeq r\sin(\phi - \phi_\infty) \simeq r(\phi - \phi_\infty)$$
$$-V \simeq \frac{d}{dt}(r\cos(\phi - \phi_\infty)) \simeq \frac{dr}{dt}$$

where $b$ is the "impact parameter" and $\phi_\infty$ is the incident direction. We see that they do satisfy the equations of motion at infinity, where $A = B = 1$, and that the constants of motion are:

$$J = bV^2 \tag{1}$$
$$E = 1 - V^2 \tag{2}$$

(Of course a photon has $V = 1$, and as we have already seen, this gives $E = 0$.) It is often more convenient to express $J$ in terms of the distance $r_0$ of closest approach to the sun, rather than the impact parameter $b$. At $r_0$, $dr/d\phi$ vanishes, so our earlier equations give:

$$J = r_0\left(\frac{1}{B(r_0)} - 1 + V^2\right)^{1/2}$$

The orbit is then described by

$$\phi(r) = \phi_\infty + \int_r^\infty \left\{ \frac{A^{\frac{1}{2}}(r)dr}{r^2\left(\frac{1}{{r_0}^2}\left[\frac{1}{B(r)-1+V^2}\right]\left[\frac{1}{B(r)-1+V^2}\right]^{-1} - \frac{1}{r^2}\right)^{\frac{1}{2}}} \right\}.$$

The total change in $\phi$ as $r$ decreases from infinity to its minimum value $r_0$ and then increases again to infinity is just twice its change from $\infty$ to $r_0$, that is, $2|\phi(r0) - \phi'_\infty|$. If the trajectory were a straight line, this would equal just $\pi$;

$$\Delta\phi = 2|\phi(r_0) - \phi_\infty| - \pi.$$

If this is positive, then the angle $\phi$ changes by more than $180°$, that is, the trajectory is bent *toward* the sun; if $\Delta\phi$ is negative then the trajectory is bent away from the sun.

The end.