Construct $R_{\mu\nu\rho\sigma} R^{\mu\nu\rho\sigma}$, which is non-zero everywhere (unlike $R = 0$)

We'll see $R_{\mu\nu\rho\sigma} R^{\mu\nu\rho\sigma}$ is finite at $\rho = 2GM$

Every other scalar is finite.

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One can find explicit coordinate trs. such that in the new coordinate system the metric is finite.
(→ in that system the scalars are manifestly finite - of course they are finite in any other coord. sys. ~~- only our coord. sys. h~~ the singularity is not original)

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(The choice of the above coord. is for a far-away observer)

The singular metric in the coordinate system of an asymptotic observer has interesting effects
→ Make this into a black hole

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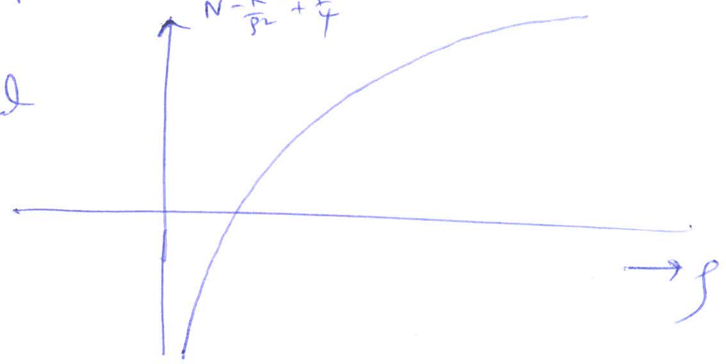
[We'll see if we start from a pt. $\rho < 2GM$ & follow a time-like curve, we can never ~~reach asymptotic~~ cross $\rho = 2GM$ i.e., we can never come out of the black hole] - time-like geodesics are relevant bcs they give the trajectory of massive particles - null-curves also can't come out - only spacelike curves can come out

3/8/07

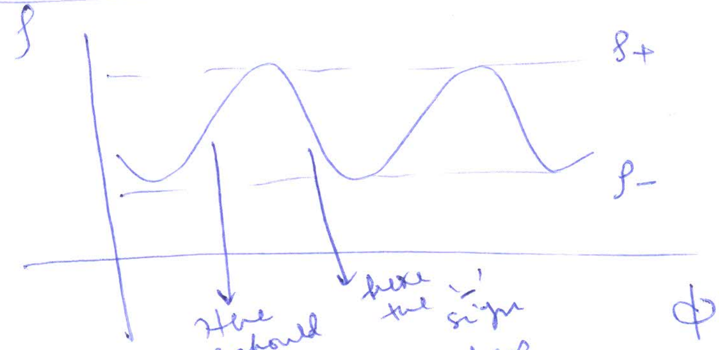
$$\frac{d\phi}{d\rho} = \pm \frac{K\sqrt{\chi(\rho)}}{\rho^2} \frac{1}{\left(N - \frac{K^2}{\rho^2} + \frac{1}{4}\right)^{1/2}}$$

As $\rho \to 0$, the curve is -ve, so the curve must cross the $\rho$-axis at least once — for bound orbit it must cross $\rho$-axis twice.

For open orbit ~~o~~ / unbounded orbit $\Rightarrow$




whether it will be bound or unbound will be det. by $N$ & $K$




Here we should take the '+' sign bcs $\frac{d\rho}{d\phi} > 0$

here the '-' sign bcs $\frac{d\rho}{d\phi} < 0$

(We determine $\rho_+ / \rho_-$ by finding the zero(s) of $N - \frac{K^2}{\rho^2} + \frac{1}{4}$ $\Rightarrow$

$$N - \frac{K^2}{\rho_+^2} + \frac{1}{\psi(\rho_+)} = 0$$

$$N - \frac{K^2}{\rho_-^2} + \frac{1}{\psi(\rho_-)} = 0$$

We get $N = \frac{1}{\rho_+^2 - \rho_-^2} \left\{ \frac{\rho_-^2}{\psi(\rho_-)} - \frac{\rho_+^2}{\psi(\rho_+)} \right\}$