

Aufgabe 3) Eigendistanz

$$\varphi(r) = \int_{R_S}^r \sqrt{g_{rr}(r')} dr'$$

$$= \int_{R_S}^r \sqrt{\frac{1}{1 - \frac{R_S}{r'}}} dr' \quad \checkmark$$

$$= \int_0^{r-R_S} \sqrt{\frac{1}{1 - \frac{R_S}{R_S + \lambda}}} d\lambda \quad \checkmark$$

$$= \int_0^{r-R_S} \sqrt{\frac{R_S}{\lambda} + 1} d\lambda \quad \checkmark$$

$$\approx \int_0^{r-R_S} \sqrt{\frac{R_S}{\lambda}} d\lambda, \text{ denn } \lambda \ll R_S \quad \checkmark$$

$$= 2\lambda \sqrt{\frac{R_S}{\lambda}} \Big|_{\lambda=0}^{r-R_S} \quad \checkmark$$

$$= 2(r-R_S) \sqrt{\frac{R_S}{r-R_S}} \quad \checkmark$$

Substitution:

$$r' = R_S + \lambda \Leftrightarrow \lambda = r' - R_S$$

$$dr' = 1 \cdot d\lambda$$

(5/5)

