$$\int \cdot \, dt$$

$$= \{\ 1 - \rho(s,r)^2 - \rho(s,t)^2 - \rho(t,r)^2 + 2\rho(t,r)\rho(s,r)\rho(t,s)$$

$$= 1 - \left(1 + \nabla\rho\left(\frac{s-t_0}{r-t_0}\right)\right)^2 + 2\left(1 + \nabla\rho\left(\frac{t-t_0}{r-t_0}\right)\right)\left(1 + \nabla\rho\left(\frac{s-t_0}{r-t_0}\right)\right) \times \left(1 + \nabla\rho\left(\frac{t-t_0}{s-t_0}\right)\right)$$

constants cancel.

1st order terms $-2\nabla\rho\left(\frac{s-t_0}{r-t_0}\right)$ $\quad 2\nabla\rho\left(\frac{s-t_0}{r-t_0}\right)$

also cancel!

$$\left\| \begin{pmatrix} s-t \\ r-t_0 \end{pmatrix} \right\|^2 = \|s-t_0\|^2 + \|r-t_0\|^2$$

2nd order terms

$$= \left(\nabla\rho\left(\frac{s-t_0}{r-t_0}\right)\right)^2 + 2\left(\nabla\rho\left(\frac{s-t_0}{r-t_0}\right)\right)\left(\nabla\rho\left(\frac{t-t_0}{r-t_0}\right)\right)$$

factor out $|s-t_0|^2 + |r-t_0|^2$ $\quad$ $\dfrac{\rho(t_0,t_0)}{\rho(t,t)}$

$$c(t,t) = \left| \frac{c(t_0,t_0) + \nabla}{c(t_0,t_0)} \right|$$