$$\boxed{\mathrm{cov}(f'(t), f'(s)) = r(t,s)}$$

$$\rho(t,s) = \cancel{\rho(t_0,t_0)}^{1} + \nabla\rho\begin{pmatrix} t-t_0 \\ s-t_0 \end{pmatrix} + \begin{pmatrix} t-t_0 \\ s-t_0 \end{pmatrix}^T \nabla^2\rho\begin{pmatrix} t-t_0 \\ s-t_0 \end{pmatrix}$$

$$\begin{pmatrix} r(t,t) & \\ & r(s,s) \end{pmatrix}$$

$\rho =$ correlation f^n!

ie not the covariance f^n.

as ~~f~~ ie $\rho = \dfrac{r(s,t)}{\sqrt{r(s,s)r(t,t)}}$

det =

okay as $r(s,s) \to r(t_0,t_0)$ and $r(t,t) \to$

so can just consider:

$$\begin{pmatrix} 1 & \rho(s,t) \\ \rho(s,t) & 1 \end{pmatrix}$$

if $\nabla\rho \neq 0$

can ignore!

has det $= 1 - \left(1 + \nabla\rho\begin{pmatrix} t-t_0 \\ s-t_0 \end{pmatrix} + \cancel{\begin{pmatrix} t-t_0 \\ s-t_0 \end{pmatrix}^T \nabla^2\rho \begin{pmatrix} t-t_0 \\ s-t_0 \end{pmatrix}}\right)^2$

$$= 2\left(\nabla\rho\begin{pmatrix} t-t_0 \\ s-t_0 \end{pmatrix}\right) + \cdots$$

$$\frac{1}{\sqrt{(t-t_0)^2 + (s-t_0)^2}}$$