in indep mult peak case,

$$\det \operatorname{cov}\left(\nabla f(t), \nabla^2 f(t)\, e_{t,s}\right)$$

$$\mathbb{E}\left[\cancel{\mu_N^1 \mu_N^2}\right]$$

$$\mathbb{P}\left(\mu_N^1 \geq 1, \mu_N^2 \geq 1\right)$$

$$= \mathbb{P}\left(\mu_N^1 \geq 1\right) \mathbb{P}\left(\mu_N^2 \geq 1\right)$$

$$= \cancel{\mathbb{E}\mu}$$

$$= \left(\mathbb{E}[\mu_N^1] + o(\varepsilon^N)\right)\left(\mathbb{E}[\mu_N^2] + o(\varepsilon^N)\right)$$

$$= \mathbb{E}\mu_N^1 \, \mathbb{E}\mu_N^2 + o(\varepsilon^N)\, \mathbb{E}\mu_N^2 + o(\varepsilon^N)\, \mathbb{E}\mu_N^1 + o(\varepsilon^{2N})$$

$$\mathbb{E}\mu_N^1 \mu_N^2$$

so have extra terms.

$s-t \quad r-t$

$$o(\varepsilon^N) = \mathbb{E}\mu_N^1 - \mathbb{P}(\mu_N^1 \geq 1)$$

$$\cancel{\nabla f(t)} \quad \det \operatorname{cov}\left(\nabla f(t), \nabla^2 f(t)\, e_{t,s}, \nabla^2 f(t) e_{r,s}\right)$$

$$\nabla^2 f(t) = \nabla^2 f(t_1) + \varepsilon Y^1$$

$$= \nabla^2 f(t_2) + Y^2$$

$(\;) \quad (\;)(\quad \nabla^2 f$

$Ax \to Ay$

$\to AyA^{-1}Ax$