2

put $X = f$ all through here!

$$= \mathbb{1}\left[\left|\frac{\nabla^2 X(\tau)}{X(\tau)} + \frac{\Lambda(\tau)}{\sigma^2}\right| > \eta_{\varepsilon}\right]$$

$$\times \int_T \delta_\varepsilon(\nabla X(t))\, \mathbb{1}[\cancel{X(t) \geq v},\ \nabla^2 X(t) < 0] \times |\det \nabla^2 X(t)|\, dt.$$

$$\leq \mathbb{1}\left[\left|\frac{\nabla^2 X(\tau)}{X(\tau)} + \frac{\Lambda(\tau)}{\sigma^2}\right| > \eta_{\varepsilon}\right]$$

$$\times \int_T \delta_\varepsilon(\nabla X(t))\, \cancel{\mathbb{1}[X(t) > v]\, \nabla^2 X}\, |\det \nabla^2 X(t)|\, dt.$$

$\boxed{L: \text{Lipschitz constants on } \nabla^2}$

$$\leq \int_T \delta_\varepsilon(\nabla X(t))\, \cancel{\mathbb{1}[X(t) > v]}\, \mathbb{1}[\exists \tau] \times \varepsilon \times \mathbb{1}[X(t) > v]$$

$$\times \sum_{\sigma \in S_n} \left(\prod_{i=1}^{n} |\nabla^2 X(t_0)_{i\sigma(i)}|\right.$$

$$\cancel{+ \|L_{i\sigma(i)}\|}\ \mathbb{1}\left[\left|\frac{\nabla^2 X(\tau)}{X(\tau)} + \frac{\Lambda(\tau)}{\sigma^2}\right| > \varepsilon\right] dt$$

$$+ \int_T \delta_\varepsilon(\nabla X(t)) \sum_{\sigma} \prod_{i} |L_{i\sigma(i)}|\, \overbrace{\|t - t_0\|}^{\leq r}\, \cancel{dt}\ \mathbb{1}[\notin A]\, dt.$$