So can consider -

$$\mathbb{E}\left[|f'(t)| \, \mathbb{1}[|f'(t)| < 0] \mid f(t) = u \right]$$

$$= -\mathbb{E}\left[\dot{x}_1(t) \ddot{x}_1(t) + \dot{x}_1(t) \mathbb{1}[\dot{x}_1 < 0] \mid x_1 \dot{x}_1 = u \right]$$

$$\ddot{x}_1 < \frac{u}{x_1} - x_1$$

$$x_1 \ddot{x}_1 + \frac{u}{x_1} < 0$$

$$= -\mathbb{E}\left[\mathbb{E}\left[\left(x_1(t) \ddot{x}_1(t) + \frac{u}{x_1} \right) \mathbb{1}[\dots < 0] \right] \right]$$

$$\mid x_1 \dot{x}_1 = u, x_1 \Big\}$$

$$= -\mathbb{E}[\dots]$$

$\omega - \lambda^2 \sigma^{-2}$

assume $\dot{x}_1 \perp\!\!\!\perp \ddot{x}_1$

$M(\lambda)$

$$\ddot{x}_1 \mid x_1 \sim N\left(-\lambda \sigma^{-2} x_1, \; \omega - \lambda^2 \sigma^{-2} \right)$$

$$\Rightarrow x_1 \ddot{x}_1 + \frac{u}{x_1} \sim N\left(-\lambda \sigma^{-2} x_1^2, \; x_1^2 (\omega - \lambda^2 \sigma^{-2}) \right)$$

$+ \frac{u}{x_1}$