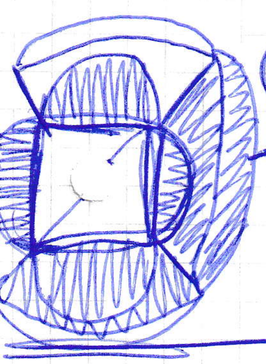
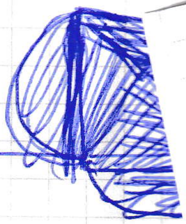


Go over why $C_k^2 < \infty$ is necessary.



$\boxed{2020}$

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

$$= \mathbb{E}[f'(s) f'(t)]$$

$$\Rightarrow \frac{d}{ds}\rho(s,t) = \frac{d}{ds}\Big|_{s=t} \mathbb{E}[f'(s) f'(t)]$$

$$= \mathbb{E}[f''(s) f'(t)]$$

$$= \mathbb{E}[f''(t) f'(t)] = 0$$

as $\rho(t,t) =$ a constant

$$\Rightarrow \mathbb{E}[f'(t)^2] = 0$$

$$\Rightarrow 2\mathbb{E}[f'(t) f''(t)] = 0$$

So $\rho(s,t) = \overbrace{\rho(t,t)}^{=1} - \mathbb{E}[f''(t)]\,(s-t)^2 + o(s-t)$

$$\frac{d^2}{ds^2}\Big|_{s=t}\rho(s,t) = \mathbb{E}[f'''(s) f'(t)] = \mathbb{E}[f'''(s) f'(t)]$$

$$= -\mathbb{E}[f''(t)^2]$$