

The Radial Kernel: Taylor Series Expansion

$$K(a, b) = e^{-\gamma(a-b)^2} = e^{-\gamma(a^2+b^2-2ab)} = e^{-\gamma(a^2+b^2)} e^{\gamma 2ab}$$

$$\text{set } \gamma = \frac{1}{2} \implies e^{-\frac{1}{2}\gamma(a^2+b^2)} \boxed{e^{ab}} \text{ Taylor expansion of this term}$$

$$f(x) = f(a) + f'(a)(x-a) + \frac{f''(a)}{2!}(x-a)^2 + \frac{f'''(a)}{3!}(x-a)^3 + \dots + \frac{f^{(\infty)}(a)}{\infty!}(x-a)^\infty$$

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots + \frac{x^\infty}{\infty!}$$

$$e^{ab} = 1 + (ab) + \frac{(ab)^2}{2!} + \frac{(ab)^3}{3!} + \dots + \frac{(ab)^\infty}{\infty!}$$

each term contains Polynomial Kernel with $r = 0$ and d from 0 to $d = \infty$



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$$f(x) = f(a) + f'(a)(x-a) + \frac{f''(a)}{2!}(x-a)^2 + \frac{f'''(a)}{3!}(x-a)^3 + \dots + \frac{f^{(\infty)}(a)}{\infty!}(x-a)^\infty$$

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots + \frac{x^\infty}{\infty!}$$

$$e^{ab} = \boxed{1} + \boxed{ab} + \frac{1}{2!} \boxed{(ab)^2} + \frac{1}{3!} (ab)^3 + \dots + \frac{1}{\infty!} \boxed{(ab)^\infty}$$

**Radial Kernels have
coordinates for
infinite dimensions!**

$$\boxed{a^0 b^0} + \boxed{a^1 b^1} + \boxed{a^2 b^2} + a^3 b^3 + \dots + \boxed{a^\infty b^\infty} = (a, a^2, a^3, \dots, a^\infty)(b, b^2, b^3, \dots, b^\infty)$$

