m

Riaz.Ahmad@fitchlearning.com

07900650341

$$f(x) \approx f(x_0)$$

$$f(x) \approx f(x_0) + f'(x_0)\,(x - x_0)$$

$$f(x) = \sum_{n=0}^{\infty} a_n (x - x_0)^n$$

$$= a_0 + a_1 (x - x_0) + a_2 (x - x_0)^2 + a_3 (x - x_0)^3 + \ldots$$

$x = x_0 \qquad f(x_0) = a_0$

$$f'(x) = a_1 + 2a_2(x - x_0) + 3a_3(x - x_0)^2$$

$x = x_0 \qquad f'(x_0) = a_1$

$$f''(x) = 2a_2 + 6a_3(x - x_0) + \cdots$$

$x = x_0 \qquad f''(x_0) = 2a_2 \Rightarrow a_2 = \frac{1}{2} f''(x_0)$

$$f'''(x) = 6a_3 + \cdots$$

$x = x_0 \qquad f'''(x_0) = 6a_3$

$$a_j = \frac{1}{j!} f'''(x_0)$$

$$\vdots$$

$$a_n = \frac{1}{n!} f^{(n)}(x_0)$$

$$f(x) = \sum_{n=0}^{\infty} \frac{f^{(n)}(x_0)}{n!} (x - x_0)^n$$

$$f = f(x) \qquad x \longrightarrow x + \delta x$$

$$f(x+\delta x) = f(x) + f'(x)\,\delta x + \frac{1}{2!} f''(x)\,\delta x^2$$

$$+ \frac{1}{3!} f'''(x)\,\delta x^3 + \underbrace{- - - -}_{H.O.T}$$

$$+ O(\delta x^4)$$

$$\delta x \equiv (x - x_0)$$

$$|x - x_0| < 1$$

$$f(x,t)$$

$$x \to x + \delta x \qquad \delta x = x - x_0$$

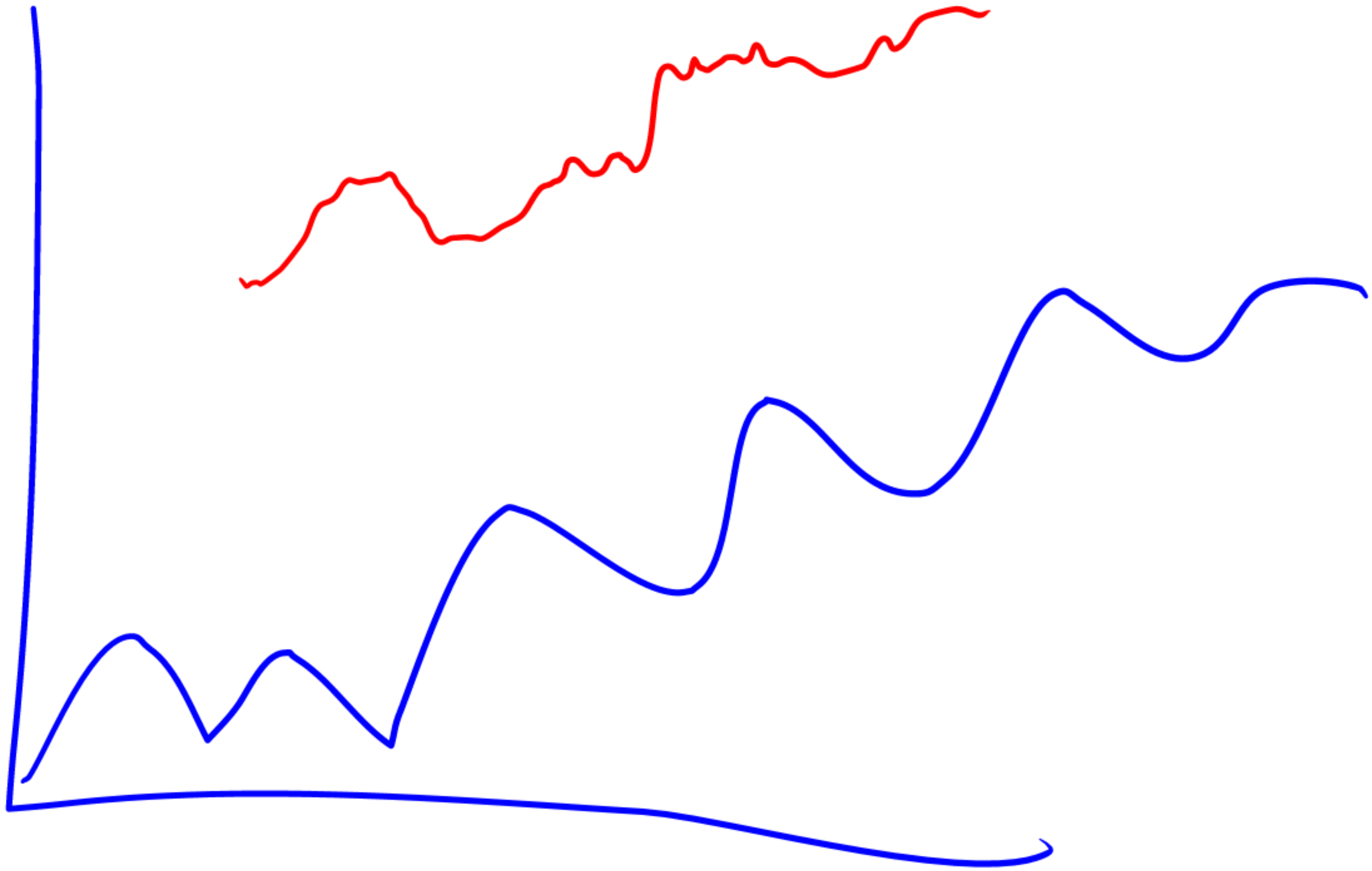
$$t \to t + \delta t \qquad \delta t = t - t_0$$

$$f(x+\delta x,\, t+\delta t) = f(x,t) + \frac{\partial f}{\partial t}\,\delta t + \frac{\partial f}{\partial x}\,\delta x$$

$$+ \frac{1}{2}\frac{\partial^2 f}{\partial x^2}\,\delta x^2 + \ldots$$

$$\underbrace{V(s+\delta s,\, t+\delta t) - V(s,t)}_{\text{differential or Total change}} = dV$$

$$dV = \frac{\partial V}{\partial s}\,\delta s + \frac{\partial V}{\partial t}\,\delta t$$



$$\frac{\delta y^2}{\delta t}$$

(a) $\delta y^2 \to 0$ quicker than dt RW collapses to zero

(b) $dt \to 0$ quicker than $\delta y^2 \to 0$ RW grows undef. "blows-up"

(c) $\frac{\delta y^2}{\delta t} \sim O(1)$ $dy^2 \sim \delta t$

$\delta y^2 \sim O(\delta t)$

$\delta y \sim O(\sqrt{\delta t})$

$$\boxed{\alpha \frac{d\xi^2}{dt} = c^2}$$

$$\left(1 + \underset{\sim}{\underline{ax}}\right)^n$$

$$|ax| < 1$$

$$|x| < \left|\frac{1}{a}\right|$$

$$\frac{\partial V}{\partial s}\frac{\partial V}{\partial t} + \frac{1}{2}\sigma^2 s^2 \frac{\partial^2 V}{\partial s^2} + rs\frac{\partial V}{\partial s} - rV = 0$$

$$V(s,t)$$

$$y\frac{d^2y}{dx^2}+2x\frac{dy}{dx}-x^4y=0$$

$$V(S+\delta S,\ t+\delta t) = V(S,t) + \frac{\partial V}{\partial t}\delta t$$

$$+ \frac{\partial V}{\partial S}\delta S + \frac{1}{2}\frac{\partial^2 V}{\partial S^2}\delta S^2 + \frac{1}{2}\frac{\partial^2 V}{\partial t^2}\delta t^2$$

$$+ \frac{\partial^2 V}{\partial S \partial t}\delta S\,\delta t + \frac{1}{3!}\frac{\partial^3 V}{\partial S^3}\delta S^3$$

$$+ \frac{1}{3!}\frac{\partial^3 V}{\partial t^3}\delta t^3 + \cdots$$

$$\int_{-\infty}^{\infty} e^{-x^2}\,dx = \sqrt{\pi}$$

$$\lim_{x\to\infty} N(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} e^{-s^2/2}\,ds \longrightarrow 1$$

$$\int_{\mathbb{R}} e^{-s^2/2}\,ds = \sqrt{2\pi} \qquad u = s/\sqrt{2}$$

$$\sqrt{2}\,du = ds$$

$$\cancel{\sqrt{2}} \int_{\mathbb{R}} e^{-u^2}\cdot du = \sqrt{\cancel{2}\pi}$$

$$\int_{-\infty}^{\infty} e^{-u^2}\,du = \sqrt{\pi}$$

$$\Rightarrow \int_0^\infty e^{-u^2}\,du = \sqrt{\pi}/2 \quad \because e^{-u^2} \text{ is even}$$

$$-\frac{1}{2}\xi f = c^2 \frac{df}{d\xi} \qquad -\int \frac{\xi}{2c^2}\,d\xi = \int \frac{df}{f}$$

$$\log f = -\frac{\xi^2}{4c^2} + B \qquad f = A e^{-\xi^2/4c^2}$$

$$\int_{\mathbb{R}} f(\xi)\,d\xi = 1 = A \int_{\mathbb{R}} e^{-\xi^2/4c^2}\,d\xi$$

Put $x = \frac{\xi}{2c} \Rightarrow 2c\,dx = d\xi$

$$2cA \underbrace{\int_{-\infty}^{\infty} e^{-x^2}\,dx}_{\sqrt{\pi}} = 1 \Rightarrow A = \frac{1}{2c\sqrt{\pi}}$$