Stationarity

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1. Define *intrinsic stationarity*.

2. Define *weak stationarity*.

3. The standard Brownian motion is a diffusion process $s(t),\ t \geq 0$ satisfying the following:

   - $s(0) = 0$.
   - $s(t)$ has independent increments.
   - For $t_1 > t_2$, $s(t_1) - s(t_2) \sim \mathcal{N}(0, \sigma^2(t_1 - t_2))$.

   Show that

   (a) a standard Brownian motion is intrinsically stationary,

   (b) a standard Brownian motion is not weakly stationary.

4. The Ornstein-Uhlenbeck process $V(t)$ is defined using the standard Brownian process $X(t)$:

$$V(t) = e^{-t}\, s(e^{2t})$$

   (a) Show that Ornstein-Uhlenbeck process $V(t)$ is weakly stationary.

   (b) Is $V(t)$ intrinsically stationary? Explain.

5. What are the assumptions of stationarity made about a stochastic process when using the different kriging methods?