Ergodicity, differentiability, continuity

Quiz, 5 questions

1 point

1.
Let W_t be a Brownian Motion considered at integer time points $t = 0, 1, 2, \ldots$ Choose the ergodic processes:

- [ ] none of above
- [x] $X_t = Ct + W_t$, where C is a non-zero constant
- [ ] $X_t = \xi t + W_t$, where $\xi \sim N(0, 1)$ and ξ is independent of W_t.

1 point

2.
Let $X_t = \cos(\omega t + \theta)$ be a stochastic process and $\theta \sim$ Unif[0, 2π], $\omega = \pi/10$. Is this process ergodic? Is it stationary?

- [ ] It is non-ergodic and weakly stationary
- [ ] It is ergodic and non-stationary
- [x] It is ergodic and weakly stationary
- [ ] none of above

1 point

3.
Let $X_t = \varepsilon_t + \xi \cos(\pi t/12)$, $t = 1, 2, \ldots$ and $\varepsilon_1, \varepsilon_2, \ldots$ be a sequence of i.i.d. random variables. Is the process X_t stationary and ergodic?

- [x] X_t is weakly stationary and ergodic
- [ ] X_t is weakly stationary and non-ergodic
- [ ] none of above

1 point

4.
Assume that for a process X_t it is known that $\mathbb{E}\left[X_t\right] = \alpha + \beta t$, $\operatorname{cov}(X_t, X_{t+h}) = e^{-h\lambda}$,

for all $h \geq 0$, $t > 0$, and some constants $\lambda > 0$, α, β. Is the process X_t stationary and ergodic?

- [ ] none of above
- [ ] X_t is non-stationary and ergodic
- [x] X_t is weakly stationary and ergodic
- [ ] X_t is weakly stationary and non-ergodic

1 point

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5.

Let $X_t = \sigma W_t + ct$, where W_t is Brownian motion, σ, c>0. Choose the correct statements about this process:

- [ ] X_t is strictly stationary
- [x] X_t is weakly stationary
- [ ] none of above
- [ ] X_t is differentiable
- [x] X_t has continuous trajectories

- [x] I, **Mark R. Lytell**, understand that submitting work that isn't my own may result in permanent failure of this course or deactivation of my Coursera account.

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