Series, Backward Shift Operator, Invertibility and Duality

Тест, 10 вопроса

1
Баллы

1.
Determine if the geometric series is convergent or divergent, and find the sum of the series if it is convergent.

$-3 + \frac{3}{2} \quad \frac{3}{4} + \frac{3}{8} \quad \ldots$

- It is divergent.
- It is convergent, and the sum is $\frac{1}{2}$.
- It is convergent, and the sum is -2.

1
Баллы

2.
Express the rational function as a geometric series: $\frac{4}{1+x}$

- $4 - 4x + 4x^2 - 4x^3 + 4x^4 - \ldots$
- $4(1 - x + x^2 - x^3 + \ldots)$
- $4\sum_{n=1}^{n=\infty}(-1)^{n-1}x^{n-1}$

1
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3.
Express the following model by utilizing Backward shift operator.

$X_t = 0.5X_{t-1} + Z_t + 0.7Z_{t-1}$

- $(1 - 0.5B)X_t = Z_t + 0.7Z_{t-1}$
- $(1 + 0.5B)X_t = (1 - 0.7B)Z_t$

- [x] $(1-0.5B)X_t = (1+0.7B)Z_t$

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4.
We write the model $X_t = X_{t-1} + 2X_{t-2} + Z_t$ as $\phi(B)X_t = Z_t$. What is $\phi(B)$?

- [x] $\phi(B) = (1-B)(1+2B)$.
- [ ] $\phi(B) = (1+B)(1-2B)$.
- [x] $\phi(B) = 1 - B - 2B^2$.

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5.
Is the following process invertible?

$X_t = Z_t + 3Z_{t-1}$

- (•) It is an invertible process since the coefficient 3 is larger than 1.
- ( ) It is not an invertible process.

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6.
For what values of the θ, the process $X_t = Z_t - \theta Z_{t-1} - 6\theta^2 Z_{t-2}$ is an invertible process.

- (•) $|\theta| < \frac{1}{3}$
- ( ) $|\theta| > \frac{1}{3}$
- ( ) $|\theta| < \frac{1}{2}$

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7.
Is the AR(2) process $X_t = 2X_{t-1} + 2X_{t-2} + Z_t$ stationary?

- [x] It is not a stationary process.
- [ ] It is a stationary process.

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8.
Find all possible values of β so that the AR(2) process $X_t = 2\beta X_{t-1} - \beta^2 X_{t-2} + Z_t$is stationary.

- [ ] $|\beta| > 1$
- [x] $|\beta| < 1$
- [ ] $|\beta| = 1$

1 Баллы

9.
Determine if the process is stationary, invertible or both: $X_t = 0.5X_{t-1} + Z_t + 4Z_{t-1}$

- [ ] Invertible but not stationary.
- [x] Stationary but not invertible.
- [ ] Stationary and invertible.
- [ ] Neither stationary nor invertible.

1 Баллы

10.
Find all values of β and θ such that duality exists for the following process, i.e., it is stationary an invertible: $X_t = \beta^2 X_{t-1} + Z_t + 8\theta^3 Z_{t-1}$.

- [x] $|\beta| < 1$ and $|\theta| < \frac{1}{2}$
- [ ] $|\beta| < 1$ and $|\theta| > \frac{1}{2}$

$|\beta| > 1$ and $|\theta| > \frac{1}{4}$

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