Stationarity

7/7 points (100.00%)

Quiz, 7 questions

✔ Congratulations! You passed!

Next Item

✔ 1 / 1 points

1.
For a weakly stationary process, which of the following are true?

☑ The mean function is constant.

Correct
Yes! Everywhere we look on the process, the mean is the same.

☑ The variance function is constant.

Correct
Yes! Everywhere we look on the process, the variance is the same.

☐ The autocovariance is constant.

Un-selected is correct

✔ 1 / 1 points

2.
A random walk is an example of a weakly stationary process.

○ Yes.

◉ No.

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Correct
That's right! We don't have constancy of variance (and may not have constancy of mean).

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1 / 1 points

3.
A moving average is an example of a weakly stationary process.

- (selected) Yes.

Correct
You bet! the mean is constant (equal to zero) and the autocovariance depends just upon lag spacing.

- No.

1 / 1 points

4.
Suppose you have the MA(2) process:

$$X_t = Z_t + .5\,Z_{t-1} + .5\,Z_{t-2}, \quad \sigma^2 = 1$$

How many terms in the ACF are nonzero?

- There are no nonzero terms.
- Exactly 2.
- (selected) Exactly 3.

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Correct

Yes! Using our formulas, we obtain 3 nonzero terms:

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$$\gamma(k) = \sum_{i=0}^{2-k} \beta_i \ \beta_{i+k}$$

$$\rho(k) = \frac{\gamma(k)}{\gamma(0)}$$

An infinite number.

1 / 1 points

5.

Let's think about our MA2 process from the last question.

$$X_t = Z_t + .5\, Z_{t-1} + .5\, Z_{t-2}, \quad \sigma^2 = 1$$

What is the autocovariance at lag zero? That is, calculate $\gamma(0)$.

1.5

Correct Response

Great job! We perform the following calculation.

$$\gamma(0) = \sum_{i=0}^{2} \beta_i \ \beta_i = \beta_0\beta_0 + \beta_1\beta_1 + \beta_2\beta_2 = 1^2 + .5^2 + .5^2 = 1.5$$

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1 / 1 points

6.
Again, consider the MA2 example.

$$X_t = Z_t + \ .5\, Z_{t-1} + \ .5\, Z_{t-2}, \quad \sigma^2 = 1$$

calculate the autocorrelation function at lag 2.

0.3333

Correct Response
Great work. We calculate as

$$\gamma(2) = \sum_{i=0}^{0} \beta_i \ \beta_{i+2} = 1 \cdot .5 = .5$$

$$\rho(2) = \frac{\gamma(2)}{\gamma(0)} = \frac{0.5}{1.5} = \frac{1}{3}$$

1 / 1

points

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7.

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Run the following code to simulate our MA(2) process as shown above. Be sure to replace XX's with the appropriate coefficients.

```
1  set.seed=1
2  (acf(arima.sim(n=1000, model=list(ma=c(.5,.5)))))
```

Run

Reset

From your graph or the function output, estimate $\rho(1)$.

- 1
- 0.531

Correct

Terrific! That is $\rho(1)$.

- 0.338