

DM-Spring-2020-Q2-Grade

82.35% (14/17)

- ✓ 1. Select the intercept-only models, if any:
- ☐ A $y = b_0 + b_1 x$
 - ☐ B $y = b_0 + b_1 x_1 + b_2 x_2$
 - ☒ C $\ln(y) = b_0$
 - ☐ D $y = e^{(b_1 x)}$
 - ☐ E I do not know
- ✓ 2. The interpretation of adjusted R^2 for multiple linear regression is the same as the interpretation of R^2 for simple linear regression.
- ☐ A True
 - ☒ B False
 - ☐ C I do not know
- ✓ 3. Which one is observable ("visible")?
- ☒ A e (residuals)
 - ☐ B ε (regression error)
 - ☐ C neither
 - ☐ D I do not know
- ✓ 4. The estimation of β is distributed as:
- ☐ A $b \sim N(0, \sigma^2)$
 - ☐ B $b \sim N(\beta, \sigma^2)$
 - ☒ C $b \sim N(\beta, \sigma^2(X^T X)^{-1})$
 - ☐ D It does not have distribution
 - ☐ E I do not know

✗ 5. How many parameters are estimated by OLS in the case of simple linear regression?

- ☐ A 1
- ☒ B 2
- ☐ C 3
- ☐ D I do not know

✓ 6. Estimation of e (residuals) is distributed as:

- ☐ A $e \sim N(0, \sigma^2)$
- ☒ B $e \sim N(0, \sigma^2 M)$ (M is a matrix)
- ☐ C It does not have distribution
- ☐ D I do not know

✗ 7. b parameters can be computed using only

- ☒ A OLS
- ☐ B ML
- ☐ C Neither
- ☐ D I do not know

✗ 8. In the case of multiple linear regression

- ☐ A $\text{adj } R^2 < 1$ (always)
- ☒ B $\text{adj } R^2 \leq 1$ (always)
- ☐ C I do not know

✓ 9. $b =$

- ☒ A $(X'X)^{-1}X'Y$
- ☐ B $(X'X)^{-1}Y'X$
- ☐ C $(Y'X)^{-1}Y'X$
- ☐ D I do not know

✓ 10. The total sum of squares equals

- ☒ A $\text{Sum}((y - \text{mean}(y))^2)$
- ☐ B $\text{Sum}((\hat{y} - \text{mean}(y))^2)$
- ☐ C $\text{Sum}((y - \hat{y})^2)$
- ☐ D I do not know

- ✓ 11. The regression sum of squares equals
- ☐ A $\text{Sum}((y - \text{mean}(y))^2)$
 - ☒ B $\text{Sum}((\hat{y} - \text{mean}(y))^2)$
 - ☐ C $\text{Sum}((y - \hat{y})^2)$
 - ☐ D I do not know
- ✓ 12. If RSS is the regression sum of squares and ESS is the error sum of squares then
- ☒ A $R^2 = 1 - \text{ESS}/\text{TSS}$
 - ☐ B $R^2 = \text{ESS}/\text{TSS}$
 - ☐ C $R^2 = \text{ESS}/\text{RSS}$
 - ☐ D I do not know
- ✓ 13. Multicollinearity occurs when
- ☒ A $\text{rank}(X) < m$ (m is the number of explanatory variables)
 - ☐ B $\text{var}(\epsilon) = \sigma^2 I$
 - ☐ C $E(\epsilon) = 0$
 - ☐ D $\text{cov}(\epsilon_i, \epsilon_j) = \text{const}$
 - ☐ E I do not know
- ✓ 14. In simple linear regression model response variable (y) can be
- ☐ A binary
 - ☐ B categorical
 - ☒ C numeric
 - ☐ D ordinal
 - ☐ E I do not know
- ✓ 15. In a simple linear regression model, explanatory variables can be
- ☐ A binary
 - ☐ B categorical
 - ☐ C numeric
 - ☐ D ordinal
 - ☐ E I do not know
 - ☒ F all answers are correct
 - ☐ G Neither

✓ 16. If A is a matrix, X is the vector of random variables, then $\text{var}(AX) =$

- ☒ A $A'\text{var}(X)A$
- ☐ B $A^2\text{var}(X)$
- ☐ C $\text{var}(x)$
- ☐ D Can not be calculated
- ☐ E I do not know

✓ 17. Which of the answers can be used to conclude about the significance of variables (if any)?

- ☒ A t values
- ☐ B Estimated coefficients (only)
- ☐ C SE of estimated coefficients (only)
- ☐ D I do not know