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57:022 Principles of Design II - Quiz #4 Solutions

Spring 2002

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Indicate "+" for ***true****, "O" for* ***false****.*

__ 1. When choosing between two different regression models, i.e., "fits" of a curve to data points, the model with the lower value of R^2 should be chosen.

__ 2. In linear regression, the "error" of a curve fitted to data points (x_i, y_i) is the vertical distance between the curve and the point (x_i, y_i).

In the "newsboy" problem, …

__ 3. we assume that we know the probability distribution of the daily demand.

__ 4. an order for newspapers must be placed before the demand is known.

__ 5. any excess inventory at the end of the day may be carried over to satisfy the next day's demand.

__ 6. if demand exceeds the quantity ordered, additional newspapers may be ordered at a higher cost.

__ 7. the number of newspapers delivered to the newsboy is random.

__ 8. Linear regression requires solving a linear programming problem.

__ 9. Student A performs ten simulations of the newsboy problem, and student B performs twenty. Suppose that both get the same average profits and the same sample variances. Then both will get the same 95%-confidence interval for the expected profit.

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Multiple choice:

__ 10. Given a set of data points (x_i,y_i), i=1,2,...n, "linear regression" is a method for determining a relationship y = f(x) which

a. sum of the errors $\sum_{i=1}^{n}\left[y_i - f(x_i)\right]$

b. maximum error: $\max_i\left[y_i - f(x_i)\right]$

c. sum of absolute values of the errors: $\sum_{i=1}^{n}\left|y_i - f(x_i)\right|$

d. sum of the squares of the errors: $\sum_{i=1}^{n}\left[y_i - f(x_i)\right]^2$

e. *None of the above*

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Match each curve on the left with its transformation on the right which might be used to get a fit by linear regression. (Note: in some cases α=a, in other cases α may be a transformation of a.)

___ $Y = ab^X$

___ $Y = ae^{bX}$

___ $Y = ae^{b/X}$

___ $Y = aX^b e^{cX}$

___ $Y = \dfrac{X}{aX-b}$

___ $Y = \dfrac{1}{a+be^{-X}}$

___ $Y = a + b\ln X$

11. $\dfrac{1}{Y} = \alpha - \beta\dfrac{1}{X}$

12. $\ln Y = \alpha + \beta\ln X + \delta X$

13. $\ln Y = \alpha + \beta\ln X$

14. $\dfrac{1}{Y} = \alpha + \beta e^{-X}$

15. $\ln Y = \alpha + \beta X$

16. $\ln Y = \alpha + \beta\dfrac{1}{X}$

17. *None of the above*