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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.
- o 5. any excess inventory at the end of the day may be carried over to satisfy the next day's demand.
- o 6. if demand exceeds the quantity ordered, additional newspapers may be ordered at a higher cost.
- o 7. the number of newspapers delivered to the newsboy is random.

- o 8. Linear regression requires solving a linear programming problem.
- o 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:**

b 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  $\sum_{i=1}^n [y_i - f(x_i)]$
- b. maximum error:  $\max_i [y_i - f(x_i)]$
- c. sum of absolute values of the errors:  $\sum_{i=1}^n |y_i - f(x_i)|$
- d. sum of the squares of the errors:  $\sum_{i=1}^n [y_i - f(x_i)]^2$

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  $\alpha=a$ , in other cases  $\alpha$  may be a transformation of a.)

<u>13</u> $Y = ab^X$	11. $\frac{1}{Y} = \alpha - \beta \frac{1}{X}$	15. $\ln Y = \alpha + \beta X$
<u>15</u> $Y = ae^{bX}$	12. $\ln Y = \alpha + \beta \ln X + \delta X$	16. $\ln Y = \alpha + \beta \frac{1}{X}$
<u>16</u> $Y = ae^{b/X}$	13. $\ln Y = \alpha + \beta \ln X$	17. <i>None of the above</i>
<u>12</u> $Y = aX^b e^{cX}$	14. $\frac{1}{Y} = \alpha + \beta e^{-X}$	
<u>11</u> $Y = \frac{X}{aX - b}$		
<u>14</u> $Y = \frac{1}{a + be^{-X}}$		
<u>17</u> $Y = a + b \ln X$		