Class 3 Clicker Question 1

Suppose we fit

$$
\begin{aligned}
Y &= \beta_0 + \beta_1 x + \epsilon \quad \text{(for data with } x \leq 550\text{)} \\
Y &= \beta_2 + \beta_3 x + \epsilon \quad \text{(for data with } x > 550\text{)}
\end{aligned}
$$

What's wrong with this approach?

A Nothing

B It uses only about half the data to fit each line

C The "for data ..." makes the model nonlinear in the β_j

D The slope changes

E The two lines above are functionally independent, whereas they should be functionally dependent.

Class 3 Clicker Question 2

$$
\begin{aligned}
Y &= \beta_0 + \beta_1 x + \epsilon \quad \text{(for data with } x \leq 550\text{)} \\
Y &= \beta_2 + (\beta_1 + \beta_3) x + \epsilon \quad \text{(for data with } x > 550\text{),}
\end{aligned}
$$

where the two lines join at $x = \kappa_1 = 550$, i.e.,
$\beta_0 + \beta_1 \times 550 = \beta_2 + (\beta_1 + \beta_3) \times 550$
Rewrite this linear dependency in the form $\beta_2 = \ldots$.

- A $\beta_2 = 0$
- B $\beta_2 = \beta_0 - \beta_3 \times 550$
- C $\beta_2 = -\beta_0 + \beta_3 \times 550$
- D $\beta_2 = \beta_0 - \beta_3 x$
- E $\beta_2 = \beta_0 \times 550 - \beta_3$.

Class 3 Clicker Question 3

$$
\begin{aligned}
Y &= \beta_0 + \beta_1 x + \epsilon \quad \text{(for data with } x \le 550\text{)} \\
Y &= \beta_0 + \beta_1 x + \beta_3 (x - 550) + \epsilon \quad \text{(for data with } x > 550\text{)}
\end{aligned}
$$

In the **X** matrix, what is the formula that gives the third column (corresponding to β_3)?

A x

B x^2

C $x - 550$

D $|x - 550|$ (absolute value)

E $\max(0, x - 550)$ (max is applied to each element of x separately).

Class 3 Clicker Question 4

Recall that to simplify the activity, we suppose x only takes the values

$$400, 450, 500, 550, 600, 650, 700$$

Numerically, what is the last column of the $\mathbf{X}$ matrix?

A $(400, 450, 500, 550, 600, 650, 700)^T$

B $(150, 100, 50, 0, 50, 100, 150)^T$

C $(-150, -100, -50, 0, 50, 100, 150)^T$

D $(0, 0, 0, 550, 600, 650, 700)^T$

E $(0, 0, 0, 0, 50, 100, 150)^T$.

Class 3 Clicker Question 5

$R^2 = 0.9242$ ($K = 5$)
$R^2 = 0.9247$ ($K = 10$)

Which model predicts better?

A It's impossible to say
B $K = 10$ because it has the larger R^2 value
C $K = 5$ because it has the smaller R^2 value
D $K = 10$ because it is more flexible
E $K = 5$ because it is simpler.