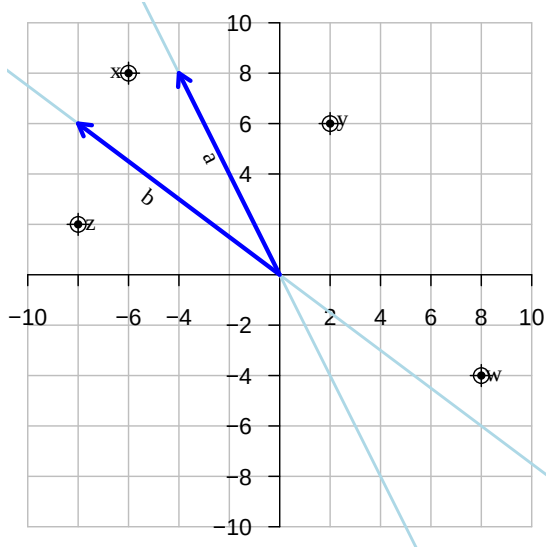
Exer 11.1 **[V/V117]**

Simpson's paradox can be understood in terms of the geometry of the explanatory vectors and the location of the response vector, which can be thought of as a "goal" point.

The graph shows two model vectors, **a** and **b**, and several goal points. We're going to use **a** and **b** individually, as well as both of them together. (We'll ignore the intercept term, **1**, for this problem, so that we can work in two dimensions without having redundant vectors. But usually **1** would be included in a model.)



For each of the goal points, give the sign of the coefficient onto each of **a** and **b** individually, and then say which vector, if either, has its coefficient reversed in sign when **a** and **b** are used together to reach the goal. Simpson's paradox occurs whenever the sign of a coefficient is reversed when another vector is added into the model.

Model Structure	Sign of Coefficient on a	Sign of Coefficient on b
`x~a`	pos neg zero Exer 11.1-1	– NA –
`x~b`	– NA –	pos neg zero Exer 11.1-2
`x~a+b`	pos neg zero Exer 11.1-3	pos neg zero Exer 11.1-4

TRUE or FALSE Exer 11.1-5 Is there Simpson's paradox involved in modeling x by a and b?

Model Structure	Sign of Coefficient on a	Sign of Coefficient on b
`y~a`	pos neg zero Exer 11.1-6	– NA –
`y~b`	– NA –	pos neg zero Exer 11.1-7
`y~a+b`	pos neg zero Exer 11.1-8	pos neg zero Exer 11.1-9

TRUE or FALSE Exer 11.1-10 Is there Simpson's paradox involved in modeling y by a and b?

Model Structure	Sign of Coefficient on a	Sign of Coefficient on b
`w~a`	pos neg zero Exer 11.1-11	– NA –
`w~b`	– NA –	pos neg zero Exer 11.1-12
`w~a+b`	pos neg zero Exer 11.1-13	pos neg zero Exer 11.1-14

TRUE or FALSE Exer 11.1-15 Simpson's paradox is involved in modeling w by a and b.

Model Structure	Sign of Coefficient on a	Sign of Coefficient on b
`z~a`	pos neg zero Exer 11.1-16	– NA –
`z~b`	– NA –	pos neg zero Exer 11.1-17
`z~a+b`	pos neg zero Exer 11.1-18	pos neg zero Exer 11.1-19

TRUE or FALSE Exer 11.1-20 Simpson's paradox involved in modeling z by a and b.