Math 4939 Quiz 10

Let Y and X be numerical variables and let G be a factor.
Let Yr and Xr be the residuals of Y and X regressed on G.
Let Xh be the least-squares predictor of X using G. Note that `X = Xh + Xr`.
All the following models except one must produce the same least-squares coefficient for the effect of X or Xr.

Quiz 10

1. Which model may produce a different coefficient? Explain why briefly.
2. In the list below, choose 6 pairs of models that produce the same coefficient for X or Xr and state which model in each pair would result in the smaller SE for the effect of X or Xr, or whether the SEs would be equal. Justify briefly. A rough sketch is acceptable.

a. `Y ~ X + G`
b. `Yr ~ Xr`
c. `Y ~ Xr + G`
d. `Y ~ X`
e. `Y ~ Xr`
f. `Y ~ X + Xh`
g. `Y ~ X + Xh + Zg` where Zg is a G-level numerical variable that is constant within levels of G.