(More open-ended - make what you will of it!): On the theme of 'can we get away with a LM instead of a GLM'...

Say $X > 0$ has some distribution. Say $E(Y|X) = \beta_0 + \beta_1 X$ for some unknown parameters $\beta_0 > 0$ and $\beta_1 > 0$. Consider two variants of this model, one which postulates that $Y|X$ has a normal distribution, the other which postulates that $Y|X$ has a Poisson distribution.

Carry out a small simulation study to compare estimators of $\boldsymbol{\beta}$ obtained under the two models, *when in fact the Poisson model is the true model.* Does there appear to be a bias in the estimator obtained by assuming the wrong model? Is one estimator more precise than another? Can the estimated precision (i.e., standard error or confidence interval) still be trusted if the wrong model is assumed?

The R functions lm() and glm() can be used to fit the normal and Poisson models respectively.

Thanks to Paul Gustafson at UBC