HW1

HW1

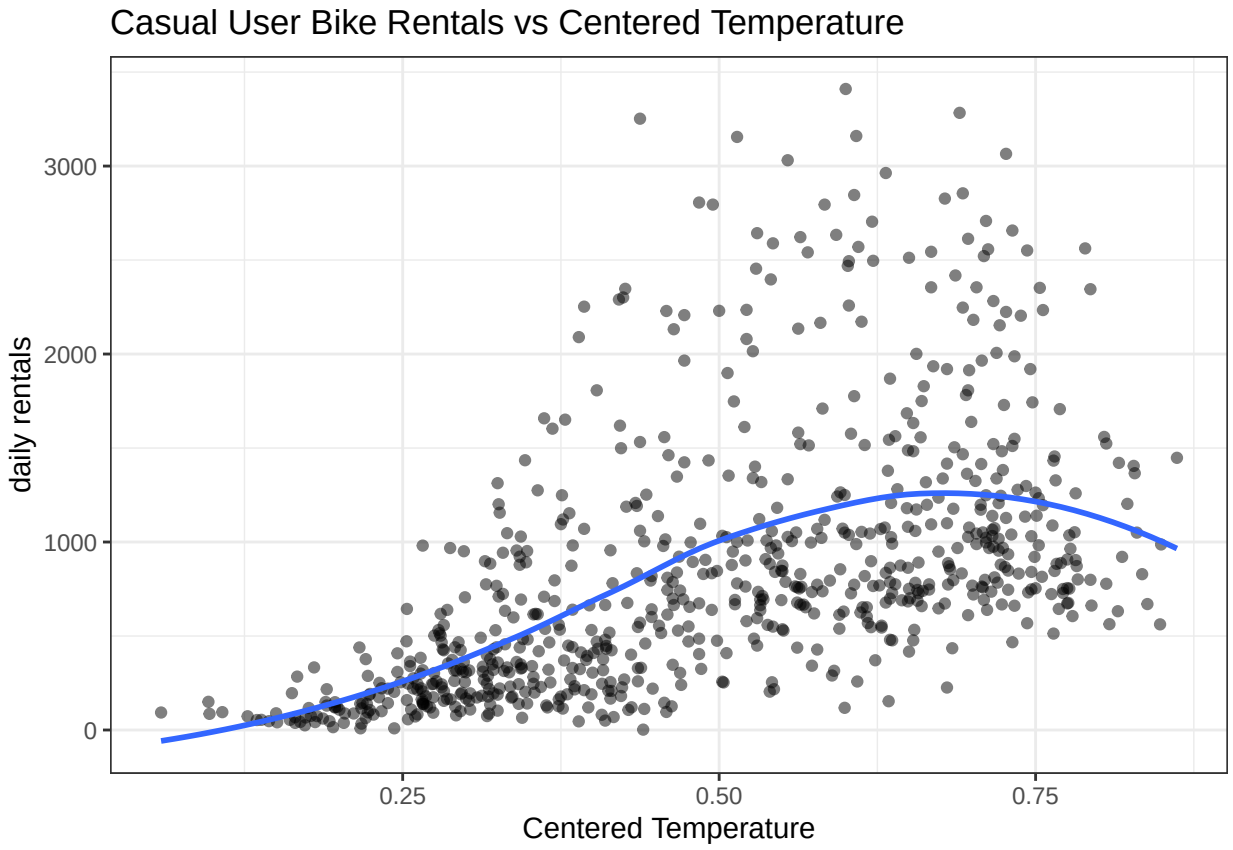
Q1. (4 points)

Recall that a Poisson (or NB) has the following relationship between the mean and covariates:

$$y_i \sim Poisson(\mu_i) \tag{1}$$
$$\log(\mu_i) = X_i\beta \tag{2}$$

Assess the model fit between casual user bike rentals and centered temperature and determine if transformations of centered temperature would result in a better fit. Defend your choice.

```
bikes <- read_csv("https://raw.githubusercontent.com/STAT506/GLM_Lectures/main/daily_bike.csv")
bikes <- bikes %>% mutate(temp_centered = temp - mean(temp))
```



Q2.

a. (4 points)

Write an R function or chunk of code to simulate data from a negative binomial regression model using a single covariate and a user specified value of ϕ.

b. (4 points)

Use the following four values of $\phi : \{.1, 1, 50, 1000\}$ and simulate a dataset. Create a paneled figure that shows y and x for each scenario.

c. (4 points)

Use `stan_glm()` to fit Poisson models and Negative Binomial models for each of the four simulated datasets. Create a table or figure that contains the intercept and slope coefficient for each outcome. Then comment on the implications of your results.

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d. (5 points)

Use `posterior_predict()` and posterior predictive checks to further interrogate the model fit (using the Poisson models)