Homework 2

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Question 1

Part A

$$y_i \sim Pois(e^{\beta_{intercept}+\beta_{condition}x_{1i}+\beta_{sex}x_{2i}+\beta_{weight}x_{3i}})$$

$$Var(\mathbf{Y}) = \mu$$

```
# part a
model1 = glm(c1 ~ cond + sex + wt1, family = poisson(link = 'log'), data = data)
summary1 = summary(model1)
```

$$y_i \sim Pois(e^{\beta_{intercept}+\beta_{condition}x_{1i}+\beta_{sex}x_{2i}+\beta_{weight}x_{3i}})$$

$$Var(\mathbf{Y}) = \phi\mu$$

Part B

```
# part b
model2 = glm(c1 ~ cond + sex + wt1, family=quasipoisson(link='log'), data=data)
summary2 = summary(model2)

se1 = summary1$coefficients[2,2]
se1_by_dispersion = summary2$coefficients[2,2]/sqrt(summary2$dispersion)
```

$$y_i \sim Pois(e^{\beta_{intercept}+\beta_{condition}x_{1i}+\beta_{sex}x_{2i}+\beta_{weight}x_{3i}+\epsilon_i})$$

$$\epsilon_i \sim \mathcal{N}(0, \sigma^2)$$

Part C

```
# part c
model3 = glmer(c1 ~ cond + sex + wt1 + (1 | fam_idno), family=poisson(link='log'), data=data)
summary3 = summary(model3)
```

Part D

Question 2

	Poisson Regression	Poisson QL	Poisson + Normal error	NB NLMIXED
Intercept	2.713 (1.837, 4.005)	2.713 (1.39, 5.293)	2.415 (1.279, 4.559)	3.021 (1.604, 5.688)
Condition	2.374 (1.822, 3.093)	2.374 (1.508, 3.738)	2.352 (1.598, 3.46)	2.357 (1.607, 3.457)
Sex	0.82 (0.698, 0.963)	0.82 (0.622, 1.081)	0.858 (0.648, 1.136)	0.843 (0.636, 1.117)
Weight	1.218 (0.94, 1.579)	1.218 (0.781, 1.901)	1.178 (0.742, 1.871)	1.105 (0.698, 1.747)
Other	NA	2.945	0.543	3.164