Quiz 2. [10 points] A clinical trial observed 41 successes from Treatment A group with size 60, and 42 failures from Treatment B group with size 80.

Q1.[4 points] Present the data using Table 1.

Q2.[6 points] Suggest two regression models for an analysis to establish how an individual's outcome is associated with his/her treatment.

Table 1.

treatment (X)	outcome (Y) Failure	Success
A		
B		

[10 points] A clinical trial observed 31 successes from Treatment A group with size 50, and 62 failures from Treatment B group with size 80.

Q1.[4 points] Present the data using Table 1.

Table 1.

treatment (X)	outcome (Y) Failure	Success	total
A	19(60-41)	41	60
B	42	38(80-42)	80

- How to estimate the OR of success for treatments A vs B?
  - the sample OR? a CI?

$\widehat{OR} = 2.385$

95% CI of $\log(OR)$:
$\log \widehat{OR} \pm (1.96) ASE_{\log \widehat{OR}} = \log(2.385) \pm (1.96) * (.357)$

- $\Longrightarrow$ 95% CI of OR: $(1.186, 4.796) =$

$(\exp\{\log \widehat{OR} - (1.96) ASE_{\log \widehat{OR}}\}, \exp\{\log \widehat{OR} + (1.96) ASE_{\log \widehat{OR}}\})$

Q2.[6 points] Suggest two regression models for an analysis to establish how an individual's outcome is associated with his/her treatment.

Q2.1 A logistic regression model: binary response $Y \sim X$?

- $logit\big(\pi(x)\big) = \beta_0 + \beta_1 x$ with $\pi(x) = P(Y = 1|X = x)$: $Y = 1, 0$ for success, failure; $X = 0, 1$ for treatments A, B.

- alternatively $logit\big(\pi(i)\big) = \beta_0 + \beta_i^X$ with $i = 1, 2$ for treatments A, B: $\beta_1^X = 0$.

- β_1 or β_2^X? is it log(OR)?

- the fitted model? how to use it?

Q2.2 A loglinear regression model: cell count (response) $V \sim X, Y$?

- Model of independence. $\log\left(\mu(x,y)\right) = \lambda_0 + \lambda_1 x + \lambda_2 y$ with $\mu(x,y) = E(V|X=x, Y=y)$: $Y = 1, 0$ for success, failure; $X = 0, 1$ for treatments A, B.

- alternatively, $\log\left(\mu(i,j)\right) = \lambda_0 + \lambda_i^X + \lambda_j^Y$ with $\mu(i,j) = E(V|X=i, Y=j)$: $\lambda_0^Y = 0$ with $j = 1, 0$ for success, failure; $\lambda_0^X = 0$ with $i = 0, 1$ for treatments A, B.

```
counts <- c(19,42,41,38)
outcome <- gl(2,2,4)
treatment <- gl(2,1,4)
glmout1b<- glm(counts ~ outcome + treatment, family = poisson())
summary(glmout1b)

Coefficients:
             Estimate Std. Error z value Pr(>|z|)
(Intercept)    3.2636     0.1610  20.272   <2e 16 ***
outcome2       0.2586     0.1704   1.517   0.1293
treatment2     0.2877     0.1708   1.684   0.0921 .
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```