

Quiz 9 – 4/26/2023

Instructions. You have 15 minutes to complete this quiz. You may use your plebe-issue TI-36X Pro calculator. You may not use any other materials.

Show all your work. To receive full credit, your solutions must be completely correct, sufficiently justified, and easy to follow.

Problem	Weight	Score
1a	1	
1b	1	
Total		/ 20

Problem 1. The *Encyclopedia Titanica* contains a dataset of the passengers on the *Titanic*, the luxury oceanliner that sank famously in the North Atlantic Ocean on its maiden voyage in April 1912.

You are interested in the relationship between survival and the passenger's age. You fit a logistic regression model, with *Survived* (1 if the passenger survived, 0 otherwise) as the response variable, and *Age* (in years) as the explanatory variable. Here is the R output:

```
Call:
glm(formula = Survived ~ Age, family = binomial, data = Titanic)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.1418  -1.0489  -0.9792   1.3039   1.4801

Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept) -0.081428   0.173862  -0.468   0.6395
Age          -0.008795   0.005232  -1.681   0.0928 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 1025.6 on 755 degrees of freedom
Residual deviance: 1022.7 on 754 degrees of freedom
(557 observations deleted due to missingness)
AIC: 1026.7

Number of Fisher Scoring iterations: 4
```

- a. Give a 95% confidence interval on the odds ratio corresponding to a unit increase in *Age*.

Note that $z_{0.05} = 1.64$, $z_{0.025} = 1.96$, and $z_{0.005} = 2.58$.

Note that this problem asks for a confidence interval on the odds ratio. See Example 1b from Lesson 29 for a similar example.

- b. Is there a statistically significant relationship between *Survived* and *Age*? Perform an appropriate hypothesis test to answer this question. State all four steps of the test, including an answer to the question above. Use a significance level of 0.05.

Since this question is asking about the association between the response variable and a single explanatory variable, the z -test (aka Wald test) is the appropriate test. See Example 1a from Lesson 29 for a similar example.