Quiz 4

Quiz, 6 questions

Congratulations! You passed!

Next Item

1 / 1
points

1.
Consider the space shuttle data **?shuttle** in the **MASS** library. Consider modeling the use of the autolander as the outcome (variable name **use**). Fit a logistic regression model with autolander (variable auto) use (labeled as "auto" 1) versus not (0) as predicted by wind sign (variable wind). Give the estimated odds ratio for autolander use comparing head winds, labeled as "head" in the variable headwind (numerator) to tail winds (denominator).

- 0.969

Correct

```
library(MASS)
data(shuttle)
## Make our own variables just for illustration
shuttle$auto <- 1 * (shuttle$use == "auto")
shuttle$headwind <- 1 * (shuttle$wind == "head")
fit <- glm(auto ~ headwind, data = shuttle, family = binomial)
exp(coef(fit))

```

```
## (Intercept)    headwind
##      1.3273      0.9687

```

```
## Another way without redifing variables
fit <- glm(relevel(use, "noauto") ~ relevel(wind, "tail"), data = shuttle,
    family = binomial)
exp(coef(fit))

```

```
##               (Intercept) relevel(wind, "tail")head
##                    1.3273                    0.9687
```

- 0.031
- -0.031
- 1.327

1 / 1

points

Quiz 4

Quiz, 6 questions

2.

Consider the previous problem. Give the estimated odds ratio for autolander use comparing head winds (numerator) to tail winds (denominator) adjusting for wind strength from the variable magn.

- 1.485
- 0.684
- 0.969

Correct

The estimate doesn't change with the inclusion of wind strength

```
shuttle$auto <- 1 * (shuttle$use == "auto")
shuttle$headwind <- 1 * (shuttle$wind == "head")
fit <- glm(auto ~ headwind + magn, data = shuttle, family = binomial)
exp(coef(fit))
```

```
## (Intercept)    headwind  magnMedium     magnOut  magnStrong
##      1.4852      0.9685      1.0000      0.6842      0.9376
```

```
## Another way without redifing variables
fit <- glm(relevel(use, "noauto") ~ relevel(wind, "tail") + magn, data = shuttle,
    family = binomial)
exp(coef(fit))
```

```
##                (Intercept) relevel(wind, "tail")head
##                     1.4852                    0.9685
##                 magnMedium                   magnOut
##                     1.0000                    0.6842
##                 magnStrong
##                     0.9376
```

- 1.00

1 / 1
points

3.

If you fit a logistic regression model to a binary variable, for example use of the autolander, then fit a logistic regression model for one minus the outcome (not using the autolander) what happens to the coefficients?

- The coefficients change in a non-linear fashion.
- The intercept changes sign, but the other coefficients don't.
- The coefficients reverse their signs.

Correct

Remember that the coefficients are on the log scale. So changing the sign changes the numerator and denominator for the exponent.

- The coefficients get inverted (one over their previous value).

---

1 / 1
points

4.

Consider the insect spray data `InsectSprays`. Fit a Poisson model using spray as a factor level. Report the estimated relative rate comapring spray A (numerator) to spray B (denominator).

- 0.9457

Correct

```
fit <- glm(count ~ relevel(spray, "B"), data = InsectSprays, family = poisson
    )
exp(coef(fit))[2]
```

```
## relevel(spray, "B")A
##               0.9457
```

- -0.056
- 0.321
- 0.136

---

0 / 1
points

5.

Consider a Poisson glm with an offset, t. So, for example, a model of the form `glm(count  x + offset(t), family = poisson)` where `x` is a factor variable comparing a treatment (1) to a control (0) and `t` is the natural log of a monitoring time. What is impact of the coefficient for `x` if we fit the model `glm(count  x + offset(t2), family = poisson)` where `2 <- log(10) + t`? In other words, what happens to the coefficients if we change the units of the offset variable. (Note, adding log(10) on the log scale is multiplying by 10 on the original scale.)

- The coefficient estimate is divided by 10.
- The coefficient is subtracted by log(10).
- The coefficient estimate is unchanged
- The coefficient estimate is multiplied by 10.

This should not be selected

Quiz 4

Quiz, 6 questions

1 / 1
points

6.
Consider the data

```
x <- -5:5
y <- c(5.12, 3.93, 2.67, 1.87, 0.52, 0.08, 0.93, 2.05, 2.54, 3.87, 4.97)
```

Using a knot point at 0, fit a linear model that looks like a hockey stick with two lines meeting at x=0. Include an intercept term, x and the knot point term. What is the estimated slope of the line after 0?

- 1.013

Correct

```
z <- (x > 0) * x
fit <- lm(y ~ x + z)
sum(coef(fit)[2:3])
```

```
## [1] 1.013
```

- 2.037
- -0.183
- -1.024