Tutorial Assignment 3 - SOLUTIONS

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MATH 4330

Question 1:

Fitting the logistic regression model using `glm()`:

```
# After reading in data using icu <- read.table("...", header=TRUE)
sys.fit <- glm(sta~age+sex+pco, data=icu, family=binomial)
summary(sys.fit)

##
## Call:
## glm(formula = sta ~ age + sex + pco, family = binomial, data = icu)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.9700  -0.7394  -0.6082  -0.3911   2.2861
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept) -3.071958   0.700168  -4.387 1.15e-05 ***
## age          0.028157   0.010737   2.623  0.00873 **
## sex          0.006077   0.373867   0.016  0.98703
## pco         -0.258943   0.605057  -0.428  0.66868
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 200.16  on 199  degrees of freedom
## Residual deviance: 192.12  on 196  degrees of freedom
## AIC: 200.12
##
## Number of Fisher Scoring iterations: 4
```

Question 2:

We can get the odds ratios for each of the predictors by taking the exponential of each corresponding coefficient:

```
exp(sys.fit$coefficients[2:4])

##       age       sex       pco
## 1.0285568 1.0060956 0.7718667
```

The odds ratios are as follows:

- OR for `age`: 1.0286. **Interpretation:** The odds of death in the ICU increases by a factor of 1.0286 (or 2.86%) for every one-year increase in age, when all other predictors are held constant.
- OR for `sex`: 1.0061. **Interpretation:** The odds of death in the ICU is 1.0061 times higher than the odds for males (or 0.61% higher), when all other predictors are held constant.
- OR for `pco`: 0.7719. **Interpretation:** The odds of death in the ICU for patients with `pH` $>=$ 7.25 is only 0.7719 times the odds of patients with `pH` $<$ 7.5 (or (1-0.7719)*100=22.81% lower), when all other predictors are held constant.