JOHNS HOPKINS
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Lecture 7d: Practice Problem Solutions

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Example: Breast Feeding Status and Age

1. Let's again consider the sample of 236 Nepali children less than three years old
   - Here is the output from the *logit* command relating breast feeding status to age (months)

```
. logit  bf age_chld

Iteration 0:   log likelihood = -131.60114
Iteration 1:   log likelihood = -90.738276
Iteration 2:   log likelihood = -82.703292
Iteration 3:   log likelihood =  -81.26411
Iteration 4:   log likelihood = -81.190302
Iteration 5:   log likelihood = -81.190047

Logistic regression                               Number of obs   =        236
                                                  LR chi2(1)      =     100.82
                                                  Prob > chi2     =     0.0000
Log likelihood = -81.190047                       Pseudo R2       =     0.3831

------------------------------------------------------------------------------
          bf |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    age_chld |  -.2450237    .035756    -6.85   0.000    -.3151041   -.1749433
       _cons |   7.431951   1.038099     7.16   0.000     5.397314    9.466588
------------------------------------------------------------------------------
```

Example: Breast Feeding Status and Age

1. Let's again consider the sample of 236 Nepali children less than three years old
   - Here is the output from the *logistic* command relating breast feeding status to age (months)

```
. logistic  bf age_chld

Logistic regression                                     Number of obs   =        236
                                                        LR chi2(1)      =     100.82
                                                        Prob > chi2     =     0.0000
Log likelihood = -81.190047                             Pseudo R2       =     0.3831

------------------------------------------------------------------------------
          bf | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    age_chld |    .782686   .0279857    -6.85   0.000     .7297129    .8395047
------------------------------------------------------------------------------
```

Death in the ICU: Patients with Sepsis

a) What do these results estimate for a comparison of the odds of being breast fed for two groups of children who differ by one year (12 months) in age, older to younger?
   - Two ways (actually both are doing the same thing)
   - Start on *log odds* (slope scale); the estimated difference in the *ln odds* (i.e., *ln odds* ratio) of being breast fed for two groups of children who differ by 12 months in age will be $12 \times \hat{\beta}_1$ where $\hat{\beta}_1$ is the estimated *ln odds* ratio for being breast fed for a one-month difference in age
   - To get the odds ratio, take $e^{12\times\hat{\beta}_1}$

$$e^{12\times\hat{\beta}_1} = e^{12\times -0.25} = e^{-3.0} \approx 0.05$$

Death in the ICU: Patients with Sepsis

a) What do these results estimate for a comparison of the odds of being breast fed for two groups of children who differ by one year (12 months) in age, older to younger?
   - Two ways (actually both are doing the same thing)
   - Start with odds ratio estimate of being breast fed for a one month difference in age and raise it to the 12th power

$$\hat{OR}^{12} = (0.78)^{12} \approx 0.05$$

   - Both approaches are mathematically equivalent; the resulting estimate shows that older children have .05 times the odds (95% lower odds) of being breast fed as compared to younger children when the age difference is 12 months

Death in the ICU: Patients with Sepsis

b) What is the 95% CI for the odds ratio estimated in Question A?
   - Again, you could first do computations on *ln odds* (regression coefficient) scale and then exponentiate the results
   - A mathematically equivalent approach involves taking the endpoints of the 95% CI for the odds ratio of breast feeding for a one month difference in age and raising each to the 12th power
   - 95% CI for OR for one month difference: (0.73, 0.84)
   - 95% CI for OR for twelve month difference: (0.7312, 0.8412) = (0.02, 0.12)