LOGISTIC REGRESSION
Joseph M Hilbe

Assignment 1
(20 points)

Q1 (2 Points)
What is the formula for the binary logistic regression link function? What does it link together?

Q2 (2 Points)
How does the logistic link function differ from the normal or Gaussian link function?

Q3 (2 Points)
Consider the given tabulation of *died* on HMO membership:

	HMO		
died	0	1	Total
0	825	157	982
1	431	82	513
Total	1,256	239	1,495

Calculate the odds ratio of *died* on HMO. Round to the nearest tenth place.

Q4 (2 Points)
Given the following table of binary logistic parameters estimates, calculate the probability of death for a non-white patient who stayed in the hospital for 10 days. Round to two decimal places.

died	Coef.	Std. Err.	z	P>|z|	[95% conf.	Interval]
White	.2526808	.2065523	1.22	0.221	-.1521542	.6575158
los	-.0299868	.0077037	-3.89	0.000	-.0450858	-.0148878
cons	-.5986826	.2132683	-2.81	0.005	-1.016681	-0.1806844

Q5 (2 Points)
Calculate the standard error of *a3* based on the variance-covariance matrix below. Round to two decimal places.

	a2	a3	_cons
a2	.735256		
a3	.533333	1.59199	
_cons	-.533333	-.533333	.533333

Q6 (2 Points)

Suppose that the coefficient of predictor a3 for a binary logistic regression model is at -3.344039, calculate its 95% confidence intervals using the variance-covariance matrix displayed for Exercise 5.

Q7 (2 points)

Given the confidence intervals calculated in question 6, is predictor a3 significant at the 95% confidence level.

Q8 (2 Points)

From the binary logistic regression output below, calculate the odds of surviving given being female.
[survived: 1=survived; 0 = died; sex: 1 = male; 0 = female]

```
      Logistic regression                             Number of obs =   2201
                                                      LR chi2 (1)   = 434.47
                                                      Prob > chi2   = 0.0000
      Log likelihood = -1167.4939                     Pseudo R2     = 0.1569
------------------------------------------------------------------------------
survived |  Coef.     Std. Err.    z      P >|z|   [95% Conf. Interval]
------------------------------------------------------------------------------
   sex   | -2.317175  .1195885   -19.38   0.000  -2.551564   -2.082786
   cons  |  1.00436   .104132      9.65   0.000    .8002648   1.208455
------------------------------------------------------------------------------
```

Q9 (2 Points)

What is the relationship of a probability function and likelihood function?

Q10 (2 Points)

Given the table below, what is the difference in the risk and odds ratios of x? Round and display to the second decimal place.

```
           X
         0   1
      -------------
      0 |  4   8  |
   y    |         |
      1 |  3   5  |
      -------------
```