Logistic Regression
Assignment 1

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Question 1

$log(\frac{\mu}{1-\mu})$

Question 2

The Gaussian link function is an identity function, $g(\mu)$, where g maps it's input back to the same input. The Gaussian link function can handle negative numbers. It's distrbution is Normal, or Gaussian.

In the logit case, a natural log can not be negative (neither can $\frac{\mu}{1-\mu}$). It has a a Binomial distribution.

Question 3

$(82/157)/(431/825) = 1.00$

Question 4

$xb_{white} = .25268$
$xb_{los} = -.02998$
$xb_{con} = -.59868$

$odds = (xb_{white})(0) + (xb_{con}) + (xb_{los})(10) + (xb_{con})$
$odds = (.25268)(0) + (-.59868) + (-.02998)(10) + (-.59868)$
$odds = (-.59868) + (-0.89848)$
$odds = -1.49716$

$p = 1/(1 + exp(-xb))$
$p = 1/(1 + exp(1.49716))$

$p = 1/(1 + 4.468979)$
$p = 1/5.468979$
$p = .18$

Question 5

$a3 = sqrt(1.59199)$
$a3 = 1.26$

Question 6

$CI_{95} = \beta + / - 1.96 * SE(\beta)$
$CI_{95l} = -3.344039 - 1.96 * 1.26$
$CI_{95l} = -5.81$

$CI_{95u} = -3.344039 + 1.96 * 1.26$
$CI_{95u} = -.87$

$CI_{95} = [-5.81 : -.87]$

Question 7

Yes, because the interval does not cross 0.

Question 8

$odds_f = exp(-2.31 * 0 + 1.00436) = exp(1.00436) = 2.73$

Question 9

Let μ be the probability of success of some event y

$\mu = Pr(y == 1)$
The liklihood or odds of this event occuring is the ratio of success to failure, or

$(\frac{\mu}{1-\mu})$

Question 10

Given a matrix of form

$m = \begin{bmatrix} A & B \\ C & D \end{bmatrix}$,

$odds = \frac{AD}{BC}$

$risk = \frac{AD+CD}{BC+CD}$

The table as given in the question is:

$m = \begin{bmatrix} 4 & 8 \\ 3 & 5 \end{bmatrix}$

However the odds and risk ratios for x, not y were asked for so we transpose this matrix

$m^T = \begin{bmatrix} 4 & 3 \\ 8 & 5 \end{bmatrix}$

Therefore

$odds = \frac{4*5}{8*3} = \frac{20}{24} = .83$

$risk = \frac{4*5+8*5}{3*8+3*5} = \frac{60}{39} = 1.54$