1. (6 points) A study is trying to predict whether or not a random person is married based on their age and sex. The response variable is Married (1 yes, 0 no) and the two predictors are Age (numerical) and Female (1 female, 0 male)

(a) (1 point) Write out the logistic regression model you will use to analyze these data. You should model the probability of being married, and set Age to have coefficient $\beta_1$ so that we’re all on the same page. No interactions.

Solution: $\log\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Female}$

In terms of the $\beta$s in your model,

(b) (1 point) What null hypothesis would you test to assess whether men and women have the same probability of being married?

Solution: $H_0: \beta_2 = 0$

(c) (1 point) What are the odds of being married for a 30 year-old female?

Solution: $\exp(\beta_0 + \beta_1(30) + \beta_2)$

(d) (1 point) What is the probability of being married for a 5 year-old boy?!

Solution: $\frac{1}{1+\exp(-\beta_0-\beta_1(5))}$

(e) (1 point) The odds of being married are ______ times greater for every five years of age.

Solution: $\exp(5\beta_1)$

(f) (1 point) The odds of being single are ______ times greater for men.

Solution: $\exp(\beta_2)$
2. (4 points) Locate your printouts from the Popsicle stick joint questions and answer the following. If you cannot locate the answer on your printout, do not answer the question. Correct answers to a question that are NOT accompanied by a supporting printout will cause your whole quiz grade to be zero. Please give answers to 4 significant figures unless integers. As usual, circle the answer on your printout and write the question number beside the circle. Benchmarks of 5% can be used.

For the model fit to the beige, 2-stick, medium overlap joints NOT made with Hot glue using glue type, clamp, quality and stress as predictors of whether the joint broke with a glue break or not,

(a) (2 points) We are 95% confident that the odds of a glue break are between _______ and _______ times as great for White glue compared to Carpenter’s glue, controlling for clamping, quality and stress.

**Solution:** 2.780 and 21.94

(b) (2 points) Is stress a significant predictor of break type, controlling for quality, clamping and glue type? Give the p-value.

**Solution:** Yes 1 p = 0.04786 1