SM339 · Applied Statistics   Spring 2024 · Uhan

Quiz 9 – 4/18/2024

Instructions. You have 15 minutes to complete this quiz. You may use your plebe-issue TI-36X Pro calculator. You may <u>not</u> use any other materials.

<u>Show all your work.</u> To receive full credit, your solutions must be completely correct, sufficiently justified, and easy to follow.

Problem	Weight	Score
1a	1	
1b	1	
1c	1	
1d	1	
1e	1	
Total		/ 50

Problem 1. In a study of 31 patients with esophageal cancer, researchers recorded the *Size* of the tumor (in cm) and whether the cancer had metastasized to the lymph nodes (*Metastasis* = 1 if yes, 0 if no). The researchers fit a logistic regression to predict the probability of metastasis based on the size of the tumor:

$$\log\left(\frac{\hat{\pi}}{1-\hat{\pi}}\right) = -2.086 + 0.5117\, Size \qquad \pi = P(Metastasis = 1)$$

a. Use this fitted model to estimate the odds of metastasis, if a patient's tumor size is 4 cm.

Note that the problem gives the logistic regression model in logit (i.e., log(odds)) form, and asks for an estimate of the odds of metastasis, not the log(odds). See Lesson 23 for details on converting between log(odds) and odds. See Example 3 in Lesson 24 for a similar example.

b. Use this fitted model to estimate the probability of metastasis, if a patient's tumor size is 4 cm.

See Lesson 23 for details on converting between log(odds), odds, and probabilities. See Example 3 in Lesson 24 for a similar example.

c. Compute the odds ratio comparing the odds of metastasis for a 5 cm tumor versus a 4 cm tumor.

d. Interpret the odds ratio from part c in the context of the problem.

Be careful and specific! Using language such as "more likely" can refer to either probabilities or odds. If your interpretation involves odds specifically, you should say so.

e. Sketch the curve of the probability form of the fitted model below.

$\hat{\pi}$

Size