

Hao-HW8

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Practice: 8.1, 8.3, 8.7, 8.15, 8.17 Graded: 8.2, 8.4, 8.8, 8.16, 8.18

8.2

- a) $120.07 - 1.93 \times \text{parity}$
- b) Children who are not first born are 1.93 ounces lighter than first born children, on average
- c) The p-value of 0.1052 indicates that there is not a statistically significant difference at the 5% significance level

8.4

- a) $18.93 - 9.11 \times \text{eth} + 3.10 \times \text{sex} + 2.15 \times \text{lrn}$
- b) eth: non-aboriginal students were absent on average 9.11 fewer days vs. aboriginal students, all else remaining equal; sex: male students were absent on average 3.10 more days vs. female students, all else remaining equal; lrn: slow learning students were absent on average 2.15 more days vs. average learning students, all else remaining equal
- c) $2 - (18.93 - 9.11 \times 0 + 3.10 \times 1 + 2.15 \times 1) = -22.18$
- d) $R^2 = 1 - 240.57 / 264.17 = 0.0893$; $\text{Adj } R^2 = 1 - (1 - R^2)(N - 1)/(N - p - 1) = 0.701$

8.8

Learner status

8.16

- a) O-rings are more likely to be damaged in colder temperatures.
- b) The negative slope of the temperature coefficient suggests that the lower the temperature, the higher the probability of damaged O-rings.
- c) $\log(\hat{p} / (1 - \hat{p})) = 11.6630 - 0.2162 \times \text{temperature}$
- d) Yes, the extremely low p-value for the temperature parameter suggest that temperature is a highly statistically significant factor in determining the probability of failure

8.18

- a) $\log(\hat{p} / (1 - \hat{p})) = 11.6630 - 0.2162 \times \text{temperature}$; $\hat{p} = \exp(11.6630 - 0.2162 \times \text{temp}) / (1 + \exp(11.6630 - 0.2162 \times \text{temp}))$
 - $\hat{p}_{51} = 0.6540$
 - $\hat{p}_{53} = 0.5509$
 - $\hat{p}_{55} = 0.4351$
- b) Add the model-estimated probabilities from part (a) on the plot, then connect these dots using a smooth curve to represent the model-estimated probabilities.
- c) Describe any concerns you may have regarding applying logistic regression in this application, and note any assumptions that are required to accept the model's validity.