W271, Unit 2 Question 3

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May 13, 2023

Logit of odds ratio

Omitting bias term, logit model:

$$\pi = \frac{exp(\beta x)}{1 - exp(\beta x)}$$

Odds ratio:

$$\frac{\pi}{1-\pi}$$

Combining two together:
Odds ratio:

$$\begin{aligned}\frac{\pi}{1-\pi} &= \frac{\frac{exp(\beta x)}{1-exp(\beta x)}}{1 - \frac{exp(\beta x)}{1-exp(\beta x)}} \\ &= \frac{\frac{exp(\beta x)}{1-exp(\beta x)}}{\frac{1}{1-exp(\beta x)}} \\ &= exp(\beta x)\end{aligned}$$

Take log of the equation:

$$\begin{aligned}log(\frac{\pi}{1-\pi}) &= log(exp(\beta x)) \\ &= \beta x\end{aligned}$$