2.1 \[ P(-|C) = 1/4 \]
\[ P(+|C) = 2/3 \]

Sensitivity = \( P(+|C) = 1 - P(-|C) = 3/4 \)
Specificity = \( P(-|\bar{C}) = 1 - P(+|\bar{C}) = 1/3 \)

2.2
\[ P(+|C) = P(-|\bar{C}) = 0.8 \]
\[ \frac{1}{\pi_{+1C} \pi_{-1C}} = \frac{1}{\pi_{+1C} \pi_{-1C}} = 2 \]
\[ \frac{\pi_{+1C} \pi_{-1C}}{\pi_{-1C} \pi_{+1C}} = 8 \]
\[ \frac{\pi_{+1C} \pi_{-1C}}{\pi_{-1C} \pi_{+1C}} = 8 \times 8 = 16 \]
\[ \theta = \frac{8 \times 8}{2 \times 2} = 16 \]

2.3
response to Injury

Difference of proportions:
\[ \pi_{L} - \pi_{2} = \left( \frac{510}{412,348} \right) + \left( \frac{160}{162,527} \right) = 0.00861 \]

Relative Risk:
\[ \hat{\pi}_{L} / \hat{\pi}_{2} = 0.00985 / 0.00124 = 7.96 \]

Odds Ratio:
\[ \hat{\theta} = \frac{\hat{\pi}_{L} \hat{\pi}_{2}}{\hat{\pi}_{2} \hat{\pi}_{L}} = 7.96 \]

\[ \hat{\pi}_{L} / \hat{\pi}_{2} \approx \hat{\theta} \] since both \( \hat{\pi}_{L}, \hat{\pi}_{2} \approx 0 \)

2.4
a. Relative Risk
b. \( \pi_{drug} = 0.55 \pi_{placebo} \)

\[ (i) \quad \frac{\pi_{drug}}{\pi_{placebo}} = 0.55 \]
\[ (ii) \quad \frac{\pi_{placebo}}{\pi_{drug}} = \frac{1}{0.55} = 1.818 \]

2.8 \[ \hat{\theta} = \frac{\pi_{f}/(1-\pi_{f})}{\pi_{m}/(1-\pi_{m})} = 11.4 \]

a. The interpretation asserts that \( \pi_{f} = 11.4 \pi_{m} \)
"the odds of survival for females was 11.4 times that for males"

The interpretation is correct if \( \pi_{m}, \pi_{f} \approx 0 \)
b. \( \pi_{f}/(1-\pi_{f}) = 2.9 \)
\( \left( \pi_{m}/(1-\pi_{m}) \right) = 2.9/11.4 = 0.254 \)
Solve \[ \pi_{f} = 2.9 - 2.9 \pi_{f} + \pi_{m} \pi_{f} \]
\[ = \pi_{f} = \frac{2.9}{(1-2.9)} = 0.744 \quad \Rightarrow \pi_{f} = 0.744 \]
\[ \tau_f = 2.9 - 2.7 \tau_f + \tau_f \]
\[ \tau_f = \frac{2.9}{1 - 2.7} = 74.4 \% \]

Similarly, \( \tau_m = \frac{0.25\%}{1 + 0.25\%} = 20.2\% \)