QUESTION The body-work of four-year old cars was compared for two different models. Of 20 cars of the first model, 9 showed a considerable degree of rusting, whereas only 6 out of the 25 of the second model did so. Is there any evidence that the finish of the second model is superior to that of the first?

ANSWER

	n	rust
Model 1	20	9
model 2	25	6
Total	45	15

$H_0 : p_1 = p_2 \quad H_1 = p_1 > p_2 \quad \alpha = 5\%$

Test2, single proportion $\hat{p} = \frac{15}{45} = \frac{1}{3} \quad \hat{q} = \frac{2}{3} \quad \frac{20}{3} > 5$ hence $\begin{matrix} n_1 & \hat{p} \\ n_2 & \hat{q} \end{matrix} > 5$

$$z = \frac{\frac{r_1}{n_1} - \frac{r_2}{n_2}}{\sqrt{\hat{p}\hat{q}(\frac{1}{n_1} + \frac{1}{n_2})}} \sim N(0,1)$$

$$z = \frac{\frac{9}{20} - \frac{6}{25}}{\sqrt{\frac{1}{3} \times \frac{2}{3}(\frac{1}{20} + \frac{1}{25})}} = 1.48$$

Hence $z$is not significant
accept $H_0 : P_1 = P_2$.