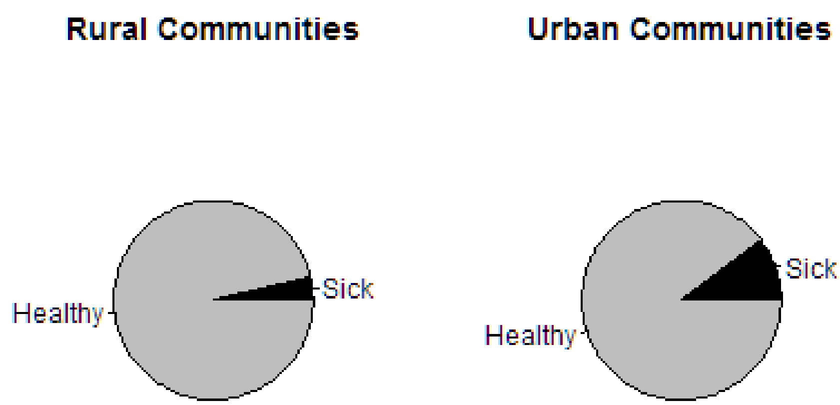
Lesson 18: Inference for Two Proportions

Homework

Solutions

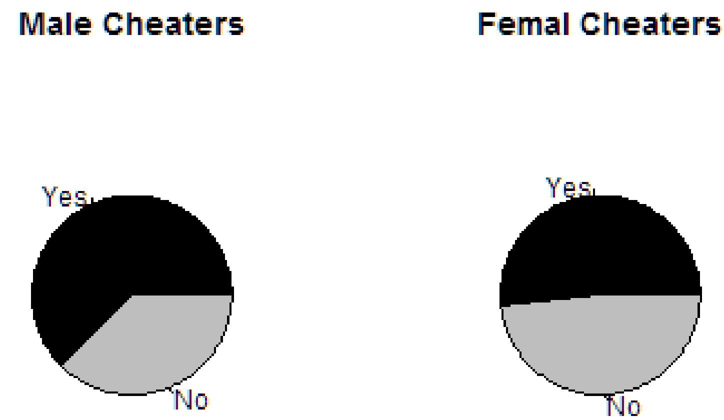
Please note that the steps show rounded numbers, but that the final answers to the problems are calculated without rounding.

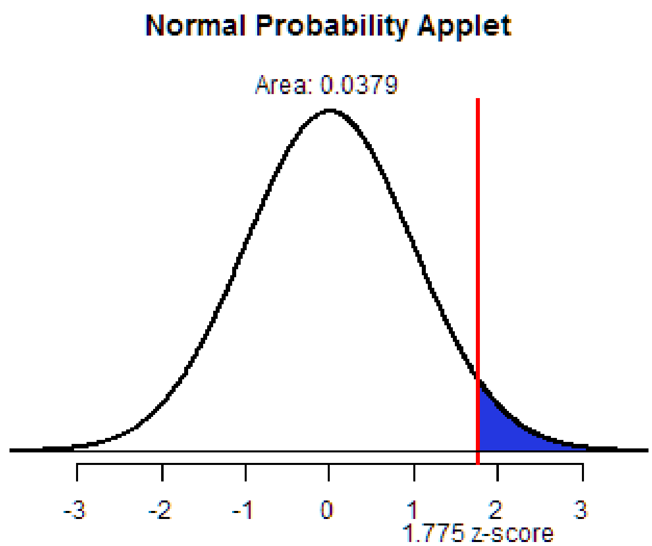


Problem	Part	Solution
1	-	
2	-	$n_1 \times \hat{p}_1 \geq 10$ and $n_1 \times (1 - \hat{p}_1) \geq 10$ $261 \times (0.038) = 10 \geq 10$ and $261 \times (1 - 0.038) = 251 \geq 10$ $n_2 \times \hat{p}_2 \geq 10$ and $n_2 \times (1 - \hat{p}_2) \geq 10$ $1614 \times (0.103) = 166 \geq 10$ and $1614 \times (1 - 0.103) = 1448 \geq 10$ The requirements are met.
3	-	(-0.092 , -0.037) We are 95 % confident that the true difference of the proportions of city children with hay fever and rural children with hay fever is between -0.092 and -0.037 . If you swapped the definition of groups 1 and 2, then you would get the same values with opposite signs: (0.037 , 0.092). This is also correct.
4	-	No. This means that it is plausible that the likelihood of a child contracting hay fever is different in the city than in rural areas.

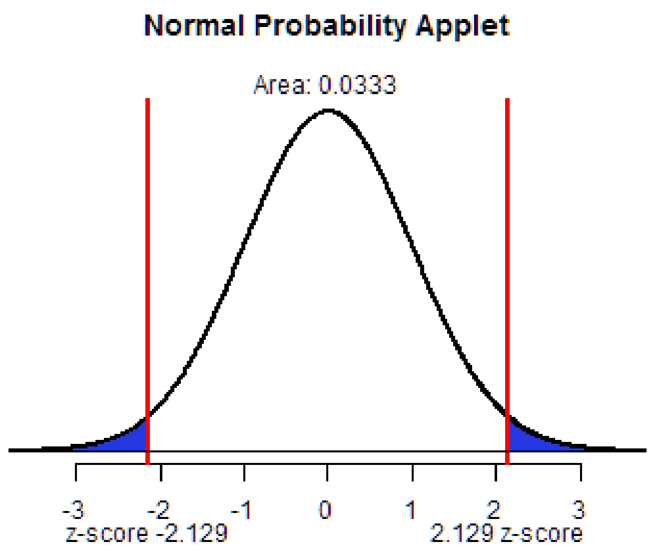
Problem	Part	Solution
5	-	$n_1 \times \hat{p}_1 \geq 10$ and $n_1 \times (1 - \hat{p}_1) \geq 10$ $200,000 \times (0.0002) = 33 \geq 10$ and $200,000 \times (1 - 0.0002) = 199,967 \geq 10$ $n_2 \times \hat{p}_2 \geq 10$ and $n_2 \times (1 - \hat{p}_2) \geq 10$ $200,000 \times (0.0006) = 115 \geq 10$ and $200,000 \times (1 - 0.0006) = 199,885 \geq 10$ The requirements are met.
6	-	(-0.00053 , -0.00029) We are 95 % confident that the true difference of the proportions of vaccinated children who developed polio and non-vaccinated children who developed polio is -0.00053 and -0.00029 . If you swapped the definition of groups 1 and 2, then you would get the same values with opposite signs: (0.00029 , 0.00053). This is also correct.

Problem	Part	Solution
7	-	



Problem	Part	Solution
8	-	$n_1 \times \hat{p}_1 \geq 10$ and $n_1 \times (1 - \hat{p}_1) \geq 10$ $117 \times (0.624) = 73 \geq 10$ and $117 \times (1 - 0.624) = 44 \geq 10$ $n_2 \times \hat{p}_2 \geq 10$ and $n_2 \times (1 - \hat{p}_2) \geq 10$ $168 \times (0.518) = 87 \geq 10$ and $168 \times (1 - 0.518) = 81 \geq 10$ The requirements are met.
9	-	$H_0 : p_1 = p_2$ $H_a : p_1 > p_2$
10	-	$\hat{p_1} = 0.624$ $\hat{p_2} = 0.518$
11	-	$z = 1.775$
12	-	p-value = 0.038
13	-	
14	-	reject the null hypothesis
15	-	There is sufficient evidence to suggest that the proportion of men who cheat in college is greater than the proportion of women who cheat in college.
16	-	The p-value would double and be equal to 0.076 . This p-value is not significant and we would fail to reject the null hypothesis. With a two sided test we would not have sufficient evidence to conclude that there is a difference between the proportion of women and men who cheat in college.

Problem	Part	Solution
17	-	$n_1 \times \hat{p}_1 \geq 10$ and $n_1 \times (1 - \hat{p}_1) \geq 10$ $1655 \times (0.03) = 50 \geq 10$ and $1655 \times (1 - 0.03) = 1605 \geq 10$ $n_2 \times \hat{p}_2 \geq 10$ and $n_2 \times (1 - \hat{p}_2) \geq 10$ $1652 \times (0.019) = 31 \geq 10$ and $1652 \times (1 - 0.019) = 1621 \geq 10$ The requirements are met.
18	-	$H_0 : p_1 = p_2$ $H_a : p_1 \neq p_2$
19	-	$\hat{p_1} = 0.03$ $\hat{p_2} = 0.019$
20	-	$z = 2.129$
21	-	p-value = 0.033



22	-	
23	-	reject the null hypothesis
24	-	There is sufficient evidence to suggestthat the proportion of Clarinex subjects with dry mouth is different than the proportion of placebo subjects with dry mouth.