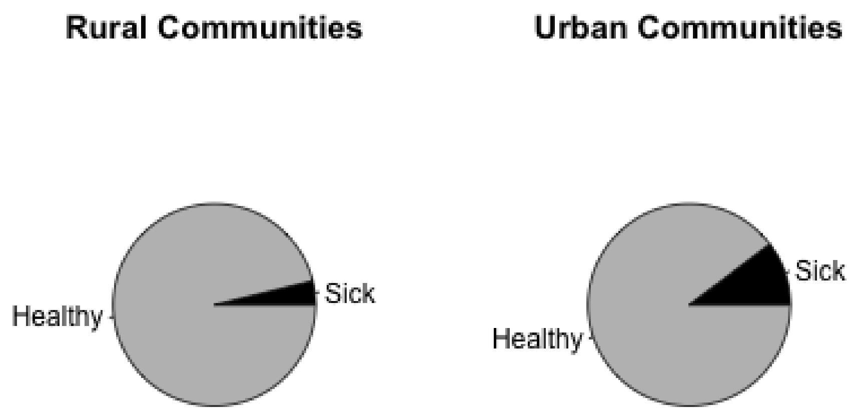
# Lesson 18: Inference for Two Proportions

Homework

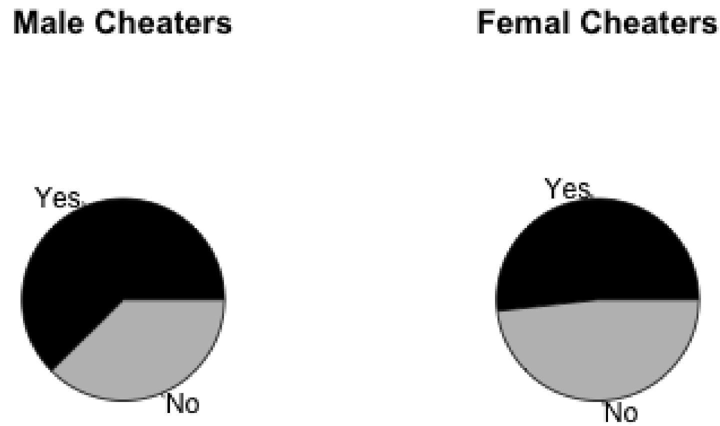
## Solutions

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

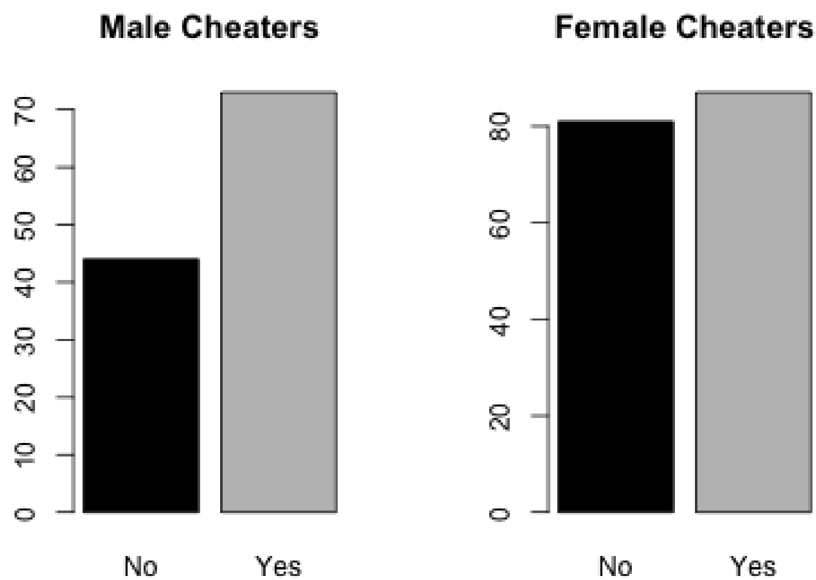
| Problem | Part | Solution |
|---|---|---|
| 1 | - |   |
| 2 | - | $n_1 \times \hat{p}_1 \geq 10$ and $n_1 \times (1 - \hat{p}_1) \geq 10$<br>$261 \times (0.038) = 10 \geq 10$ and $261 \times (1 - 0.038) = 251 \geq 10$<br><br>$n_2 \times \hat{p}_2 \geq 10$ and $n_2 \times (1 - \hat{p}_2) \geq 10$<br>$1614 \times (0.103) = 166 \geq 10$ and $1614 \times (1 - 0.103) = 1448 \geq 10$<br><br>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 .<br><br>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 $n_1 \times (1 - \hat{p}_1) \geq 10$<br>$200,000 \times (0.0002) = 33 \geq 10$ and $200,000 \times (1 - 0.0002) = 199,967 \geq 10$<br><br>$n_2 \times \hat{p}_2 \geq 10$ and $n_2 \times (1 - \hat{p}_2) \geq 10$<br>$200,000 \times (0.0006) = 115 \geq 10$ and $200,000 \times (1 - 0.0006) = 199,885 \geq 10$<br><br>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 .<br><br>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. |

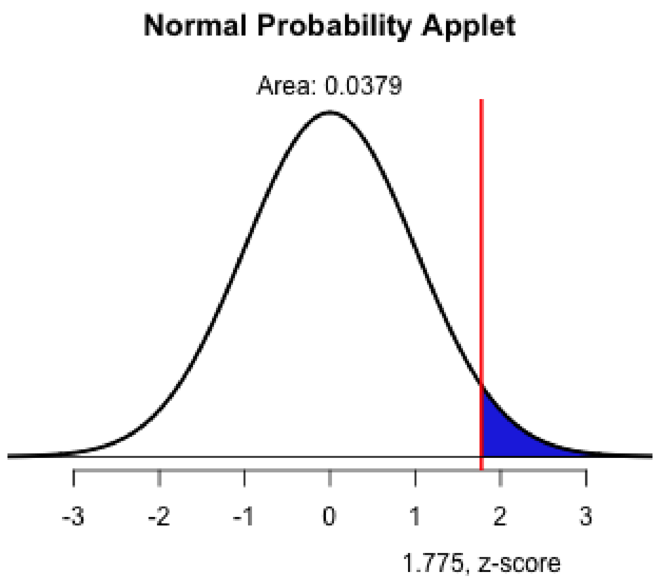
| Problem | Part | Solution |
|---|---|---|




| | | |
|---|---|---|
| 7 | - | |



| Problem | Part | Solution |
|---|---|---|
| 8 | - | $n_1 \times \hat{p}_1 \geq 10$ and $n_1 \times (1 - \hat{p}_1) \geq 10$<br>$117 \times (0.624) = 73 \geq 10$ and $117 \times (1 - 0.624) = 44 \geq 10$<br><br>$n_2 \times \hat{p}_2 \geq 10$ and $n_2 \times (1 - \hat{p}_2) \geq 10$<br>$168 \times (0.518) = 87 \geq 10$ and $168 \times (1 - 0.518) = 81 \geq 10$<br><br>The requirements are met. |
| 9 | - | $H_0 : p_1 = p_2$<br>$H_a : p_1 > p_2$ |
| 10 | - | $\hat{p_1} = 0.624$<br>$\hat{p_2} = 0.518$ |
| 11 | - | $z = 1.775$ |
| 12 | - | p-value = 0.038 |




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

| Problem | Part | Solution |
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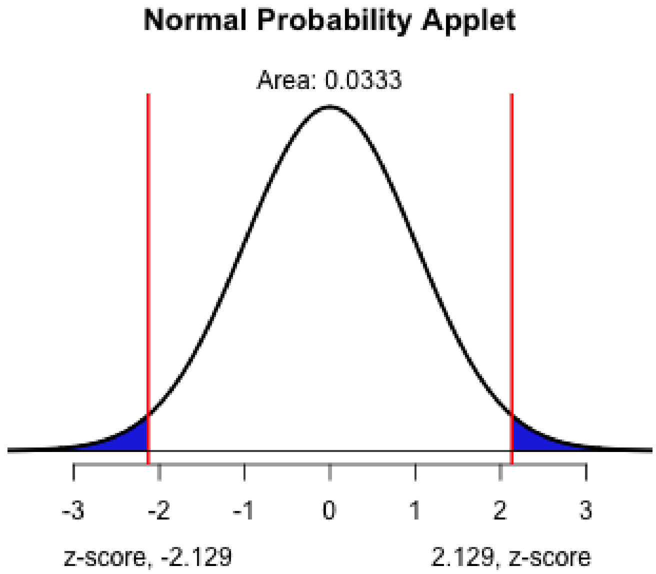
| 20 | - | $z = 2.129$ |
| 21 | - | p-value $= 0.033$ |




| Problem | Part | Solution |
| --- | --- | --- |
| 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. |