

Math 247: Hypothesis Testing with Proportions (Section 8.1, 8.2, 8.3)

Example: We're getting a LOT of information right now about the coronavirus, with some of it changing almost daily, including information about the importance of social distancing and sheltering at home.

Since you all are becoming certified statistics experts, you can now take conflicting information and decide what's more likely to be true. Take for instance the recent CDC statement that "as many as 25% of people infected with the new coronavirus remain asymptomatic" which means a lot of people who continue to run around and not remain socially distant are spreading the disease. But is that 25% correct? Is it too high? Too low?

Let's look at data from Iceland where extensive testing is being done. (Their goal is to test everyone in their small island population, not just people who are sick or who have been exposed to the virus). They found that out of 180 people who tested positive, 90 of them (50 percent!) did not have any symptoms. What does this data tell us about the CDC number?

Perform a hypothesis test to see whether the true proportion of asymptomatic people in the population is higher than 25%.

StatCrunch Results:

Normal Distribution Calculator $P(z \geq 7.747)$

StatCrunch interface showing the Normal Calculator. The 'Stat' menu is open, and 'Calculators' is selected. The 'Normal Calculator' window is active, showing a normal distribution curve with a mean of 0 and standard deviation of 1. The calculated probability $P(X \geq 7.747) = 4.6629e-15$ is displayed.

Hypothesis Test: In StatCrunch, select:



StatCrunch interface showing the navigation path for a hypothesis test. The 'Stat' menu is open, and 'Proportion Stats' is selected. The 'One Sample' sub-menu is open, and 'With Summary' is selected. The 'Options' window is active, showing the hypothesis test results.

One sample proportion summary hypothesis test:
 p : Proportion of successes
 $H_0: p = 0.25$
 $H_A: p > 0.25$

Hypothesis test results:

Proportion	Count	Total	Sample Prop.	Std. Err.	Z-Stat	P-value
p	90	180	0.5	0.032274861	7.7459667	<0.0001