

8C Calculate the Size and Power of a Test

Size of a test:

Power of a test:

Complete the table using size, power and P(Type II error).

Test result	H_0 is true	H_0 is false
Accept H_0		
Reject H_0		

Ways to increase the power of a test:

1. The random variable X has a binomial distribution. A random sample of size 25 was taken to test $H_0: p = 0.30$ against $H_1: p < 0.30$ using a 10% level of significance.

a) Find the critical region for this test.

b) Find the size of this test.

Given that $p = 0.20$,

c) calculate the power of this test.

2. Jam is sold in jars. The amount of jam, in grams, in a jar is normally distributed with mean μ and standard deviation 5. The manufacturer claims that μ is 106 and quality control officers will take action against the manufacturer if $\mu < 106$. A random sample of 30 jars is examined and a 5% level of significance is used.

a) Find the critical region for the sample mean using this test.

Given that in fact $\mu = 102$,

b) find the power of this test.

3. A particular mobile-phone provider fails to deliver text messages with probability p . Brooke wants to investigate whether $p > 0.02$.

Using $H_0: p = 0.02$ and $H_1: p > 0.02$, Brooke notes the number of text messages she is able to send successfully up until the first failure. If this value is less than or equal to 5 she rejects H_0 . If it is more than 100 she accepts H_0 . If it is more than 5 but less than or equal to 100 she notes the number of additional text messages she is able to send successfully up until the next failure. She rejects H_0 if this is less than or equal to 5 and accepts it otherwise.

a) Find the size of this test.

b) Calculate the power of this test when $p = 0.015$.

