

# Week 7 - Exercises

**For more resources:**

<http://www1.psych.purdue.edu/~gfrancis/calculators/calculators.html>

(Try different web browsers to open the link)

**1)** Which of the following choices is the best definition of power?

- A) It is the probability of rejecting a true null hypothesis.
- B) It is the probability of rejecting a false null hypothesis.
- C) It is the probability the null hypothesis is false.
- D) It is the probability the alternative hypothesis is true.
- E) It is the probability of failing to reject a false null hypothesis.

**2)** Which of the following choices will increase the power of an experiment.

- A) bigger sample sizes.
- B) bigger standard deviation.
- C) bigger significance (alpha) level.
- D) a one tailed rather than a two-tailed test.
- E) bigger mean values.
- F) a two sample rather than a one sample test.

**3)** Power is highest for the

- A) .01 level
- B) .05 level
- C) .10 level

**4)** What increases power more?

- A) An increase in sample size from 10 to 20
- B) An increase in sample size from 20 to 30

**5)** As sample size increases, power

- A) increases quickly at first and then levels off
- B) increases linearly
- C) is unaffected

**6)** As sample size increases, the Type I error rate

- A) Increases
- B) Decreases
- C) Increases and then decreases
- D) Does not change

**7)** Increasing the difference between the population mean and the hypothesized mean

- A) Increases power
- B) Decreases power

**8)** Which is more powerful

- A) One-tailed tests
- B) Two-tailed tests

**9)** The larger the standard deviation, the higher the power

- A) True
- B) False

**10)** If the null hypothesis is false, which of the following is/are true?

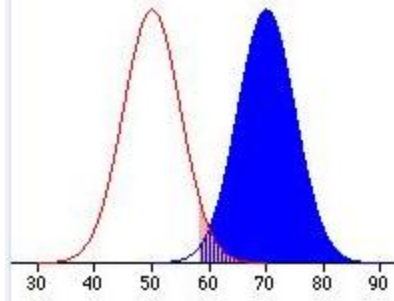
- A) Increasing sample size increases power.
- B) Increasing sample size decreases the Type I error rate.
- C) The smaller the difference between the hypothesized mean and the population mean, the lower the power.
- D) A test at the .05 level has more power than a test at the .01 level.

**11)** If the power of an experiment is low, then

- A) The experiment will likely be inconclusive.
- B) Any significant findings obtained are suspect.
- C) The results are skewed.

12)

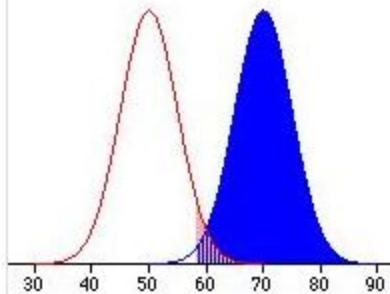
The graph below displays power for a one-sample Z-test of the null hypothesis that the population mean is 50. The red distribution is the sampling distribution of the mean assuming the null hypothesis is true. The blue distribution is the sampling distribution of the mean assuming the population mean is 70. A sample mean over 58 is significantly greater than 50 at the .05 level. The shaded area in the red distribution is



- A) Type I error rate
- B) Power

13)

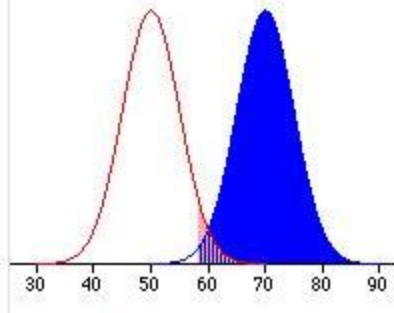
The graph below displays power for a one-sample Z-test of the null hypothesis that the population mean is 50. The red distribution is the sampling distribution of the mean assuming the null hypothesis is true. The blue distribution is the sampling distribution of the mean assuming the population mean is 70. A sample mean over 58 is significantly greater than 50 at the .05 level. The shaded area in the blue distribution is



- A) Type I error rate
- B) Power

14)

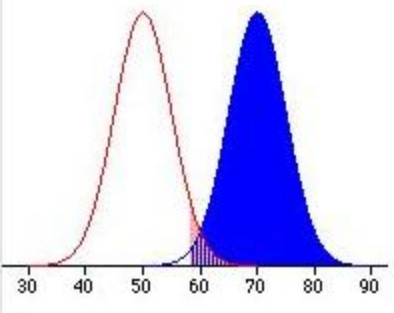
The graph below displays power for a one-sample Z-test of the null hypothesis that the population mean is 50. The red distribution is the sampling distribution of the mean assuming the null hypothesis is true. The blue distribution is the sampling distribution of the mean assuming the population mean is 70. A sample mean over 58 is significantly greater than 50 at the .05 level. If the blue distribution had a mean of 75 instead of 70 then:



- A) The Type I error rate would increase
- B) Power would increase
- C) The two distributions would not overlap
- D) The cut-off point for significance would increase

15)

The graph below displays power for a one-sample Z-test of the null hypothesis that the population mean is 50. The red distribution is the sampling distribution of the mean assuming the null hypothesis is true. The blue distribution is the sampling distribution of the mean assuming the population mean is 70. A sample mean over 58 is significantly greater than 50 at the .05 level. If the standard deviation were reduced then:



- A) The Type I error rate would increase
- B) Power would increase
- C) The cut-off point for significance would decrease

16)

The following table lists the properties of five experiments that each used a t-test to determine if there was a significant difference between population means.  $n$  is the sample size for each group. Each experiment was tested with  $\alpha = .05$  for a two-tailed test. Which of the follow correctly describes the order of the experimental powers?

Experiment	$n$	$\mu_1$	$\mu_2$	$\sigma$
a	20	29	33	12
b	75	34	40	6
c	240	45	50	27
d	4	150	120	10
e	300	30	31	8

- A)  $b > c > e > a > d$ .
- B)  $a > d > b > c > e$ .
- C)  $b > d > c > e > a$ .
- D)  $c > a > e > b > d$ .