

Exercise walk-through

7.8

Setting Up a Test for the Difference of Two Population Means

AP Statistics

Two-mean test and paired data

A **two-sample t-test** t of
 $H_0 : \mu_1 = \mu_2$ - **do not pool** (unlike
 proportions):

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{s_1^2/n_1 + s_2^2/n_2}}$$

Same subjects measured twice? Use a
paired t-test t : reduce each
 pair to a difference d , then a one-sample
 t .

Brands

$\bar{x}_1 = 85, \bar{x}_2 = 78; SE = \sqrt{2}$:

$$t = \frac{7}{1.414} \approx 4.95$$

$df = 8, p \approx 0.001$: reject.

Exercises 2.1-2.3

2.1 State the null hypothesis for a two-sample mean test. [1]

2.2 Write the test-statistic formula for a difference of means. [1]

2.3 For $\bar{x}_1 = 50$, $s_1 = 6$, $n_1 = 36$, $\bar{x}_2 = 45$, $s_2 = 8$, $n_2 = 64$, find the standard error
 $\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$. [2]

Exercises 2.1-2.3

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2.1

- $H_0 : \mu_1 = \mu_2$
-

2.2 Write the test-statistic formula for a difference of means. [1]

2.2

- $$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{s_1^2/n_1 + s_2^2/n_2}}$$

2.3 For $\bar{x}_1 = 50$, $s_1 = 6$, $n_1 = 36$, $\bar{x}_2 = 45$, $s_2 = 8$, $n_2 = 64$, find the standard error
 $\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$. [2]

2.3

- $$\sqrt{\frac{36}{36} + \frac{64}{64}} = \sqrt{1 + 1} = \sqrt{2} \approx 1.41$$

Exercise 3.1

3.1 The null hypothesis for a two-sample mean test is

[1]

☐

A $\mu_1 \neq \mu_2$

B $\mu_1 = \mu_2$

C $\mu_1 = 0$

D $\bar{x}_1 = \bar{x}_2$

Exercise 3.1

3.1 The null hypothesis for a two-sample mean test is [1]

☐

A $\mu_1 \neq \mu_2$

B $\mu_1 = \mu_2$

C $\mu_1 = 0$

D $\bar{x}_1 = \bar{x}_2$

3.1 B

- $\mu_1 = \mu_2$.

Exercise 3.2

3.2 The test statistic for a difference of means uses the standard error

[1]

☐ **A** $\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$

B $s_1 + s_2$

C $s_1 \cdot s_2$

D $\sqrt{np}$

Exercise 3.2

3.2 The test statistic for a difference of means uses the standard error

[1]

- ☐ **A** $\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$
- B** $s_1 + s_2$
- C** $s_1 \cdot s_2$
- D** $\sqrt{np}$

3.2 A

• $\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}.$

Exercise 3.3 (a)

3.3 $\bar{x}_1 = 70$, $s_1 = 10$, $n_1 = 25$, $\bar{x}_2 = 65$, $s_2 = 10$, $n_2 = 25$.

(a) Find the standard error.

[2]

Exercise 3.3 (a)

3.3 $\bar{x}_1 = 70$, $s_1 = 10$, $n_1 = 25$, $\bar{x}_2 = 65$, $s_2 = 10$, $n_2 = 25$.

(a) Find the standard error.

[2]

(a)

- $\bullet \sqrt{\frac{100}{25} + \frac{100}{25}} = \sqrt{8} \approx 2.83$

Exercise 3.3 (b)

3.3 $\bar{x}_1 = 70$, $s_1 = 10$, $n_1 = 25$, $\bar{x}_2 = 65$, $s_2 = 10$, $n_2 = 25$.

(b) Compute the test statistic t .

[2]

Exercise 3.3 (b)

3.3 $\bar{x}_1 = 70$, $s_1 = 10$, $n_1 = 25$, $\bar{x}_2 = 65$, $s_2 = 10$, $n_2 = 25$.

(b) Compute the test statistic t .

[2]

(b)

- $t = \frac{70 - 65}{2.83} \approx 1.77$