

7.7 Justifying a Claim About the Difference of Two Means Based on a Confidence Interval

Name: _____ Class: _____ Date: _____ Total: 8 marks

Objective

Build the skills to answer exam questions on **justifying a claim about a difference of means from a confidence interval**.

You must be able to:

- use a CI for $\mu_1 - \mu_2$ to judge a claim of no difference
- recognise an interval containing 0 as "no significant difference"

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Judging a difference

A confidence interval for $\mu_1 - \mu_2$ gives the plausible differences:

- if it **contains** 0, "no difference" ($\mu_1 = \mu_2$) is plausible;
- if it is entirely positive or negative, there is a significant difference.

■ Reading a worked interval

A 95% interval for $\mu_1 - \mu_2$ comes out as (1.2, 5.4). It is entirely **positive** and excludes 0, so group 1's mean is significantly higher. An interval of (−1.1, 3.0) would contain 0 – no significant difference.

2 Practice

2.1 State how a CI for $\mu_1 - \mu_2$ judges "no difference". [1]

2.2 A 95% CI for $\mu_1 - \mu_2$ is (−1, 3). State whether "no difference" is plausible. [1]

2.3 State what a fully positive interval implies. [1]

3 Exam-style questions

3.1 "No difference" ($\mu_1 = \mu_2$) is plausible if the CI for $\mu_1 - \mu_2$ contains [1]

- A 1
- B 0
- C $\bar{x}_1$
- D the mean

3.2 A 95% CI for $\mu_1 - \mu_2$ is (2, 6). The claim $\mu_1 = \mu_2$ is [1]

- A supported
- B not supported
- C certainly true
- D unknown

3.3 A 95% CI for the difference in mean scores is (−2, 5).

(a) State whether 0 is in the interval. [1]

(b) State whether the means differ significantly. [1]

(c) State the plausible conclusion. [1]

Solutions

2.1 if the interval contains 0, “no difference” is plausible.

2.2 yes, plausible (0 is inside).

2.3 that $\mu_1 > \mu_2$ (a real difference).

3.1 B.

3.2 B.

3.3 (a) yes. (b) no. (c) there is no significant difference between the means.