AP STATISTICS • EXERCISE SHEET

# 7.6 Confidence Intervals for the Difference of Two Means

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

## Objective

Build the skills to answer exam questions on **a confidence interval for the difference of two means**.

**You must be able to:**

- use the point estimate $\bar{x}_1 - \bar{x}_2$
- build the interval $(\bar{x}_1 - \bar{x}_2) \pm t^* \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$
- use the interval to judge whether the two means differ

## 1 Worked examples

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

■ **The two-mean interval**

$$(\bar{x}_1 - \bar{x}_2) \pm t^* \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}.$$

■ **Judging a difference**

If the interval **contains** 0, the two means may not differ. If it is entirely **positive** ($\mu_1 > \mu_2$) or **negative** ($\mu_1 < \mu_2$), there is a significant difference.

## 2 Practice

**2.1** Write the point estimate for the difference of two means. [1]

**2.2** State how to judge whether the means differ using the interval. [1]

**2.3** For $\bar{x}_1 = 52$ and $\bar{x}_2 = 48$, find the point estimate of the difference. [1]

## 3 Exam-style questions

**3.1** A confidence interval for $\mu_1 - \mu_2$ is centred on [1]

A B
C D

**A** $\bar{x}_1 \cdot \bar{x}_2$
**B** $\bar{x}_1 - \bar{x}_2$
**C** $0$
**D** $\bar{x}_1 + \bar{x}_2$

**3.2** If a 95% CI for $\mu_1 - \mu_2$ contains 0, the two means [1]

A B
C D

**A** definitely differ
**B** may not differ
**C** are exactly equal
**D** are both zero

**3.3** A 95% CI for $\mu_1 - \mu_2$ is $(1.5, 4.5)$.

(a) State which mean is larger. [1]

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

(c) State whether there is a significant difference. [1]