AP STATISTICS • EXERCISE SHEET

7.4 Setting Up a Test for a Population Mean

Name: _____ Class: _____ Date: _____ **Total: 10 marks**

Objective

Build the skills to answer exam questions on **setting up a test for a population mean**.

You must be able to:

- state the hypotheses $H_0 : \mu = \mu_0$ and H_a
- write the test statistic $t = \dfrac{\bar{x} - \mu_0}{s/\sqrt{n}}$
- state the degrees of freedom $n - 1$

1 Worked examples

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

■ **Hypotheses**

- **Null** $H_0 : \mu = \mu_0$.
- **Alternative** $H_a : \mu \neq \mu_0$ (or $<$, or $>$).

■ **Test statistic**

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}, \qquad \text{df} = n - 1.$$

■ **Example**

$\bar{x} = 52$, $\mu_0 = 50$, $s = 8$, $n = 16$: $t = \dfrac{52 - 50}{8/4} = \dfrac{2}{2} = 1.0$.

2 Practice

2.1 State the null hypothesis for a test about a mean. [1]

2.2 Write the test-statistic formula for a mean. [1]

2.3 $\bar{x} = 52$, $\mu_0 = 50$, $s = 8$, $n = 16$. Find the test statistic t. [2]

3 Exam-style questions

3.1 The test statistic for a mean is [1]

- **A** $\dfrac{\bar{x} - \mu_0}{s/\sqrt{n}}$
- **B** $\dfrac{\hat{p} - p_0}{\text{SE}}$
- **C** $\bar{x} \cdot s$
- **D** $\dfrac{\mu_0}{n}$

3.2 The degrees of freedom for a one-sample mean test are [1]

- **A** n
- **B** $n - 1$
- **C** $n + 1$
- **D** 0

3.3 A test of $\mu \neq 100$ has $\bar{x} = 104$, $s = 10$, $n = 25$.

(a) Write H_0. [1]

(b) Compute t. [2]

(c) State the degrees of freedom. [1]

4 Go further

- work through the **7.4 Setting Up a Test for a Population Mean** lesson on the **Learn** page;

- read the **Inference for Quantitative Data: Means** section of the AP Statistics handout on the **Know** page.

Solutions

2.1 $H_0 : \mu = \mu_0$.

2.2 $t = \dfrac{\bar{x} - \mu_0}{s/\sqrt{n}}$.

2.3 $t = \dfrac{52 - 50}{8/\sqrt{16}} = \dfrac{2}{2} = 1.0$.

3.1 **A**.

3.2 **B**.

3.3 (a) $H_0 : \mu = 100$. (b) $t = \dfrac{104 - 100}{10/\sqrt{25}} = \dfrac{4}{2} = 2.0$. (c) 24.