Statistics topic test 4 - service investigation

Name: _____ Date: _____

10 questions | 40 marks | 65 minutes

A progressive original paper on investigation design, numerical summaries and evidence-based interpretation.

A scientific calculator may be used.

1. A manager compares daily waiting times at two service branches. [4 marks]

(a) Write a measurable question. [2 marks]

(b) Give two collection rules for a fair comparison. [2 marks]

2. Branch A records every tenth arrival after a random start. B records customers volunteering to complain. [4 marks]

(a) Name both methods. [2 marks]

(b) Why may their summaries not compare the branches fairly? [2 marks]

3. Waiting times are 4, 6, 7, 7, 9, 10, 12, 17 minutes. [4 marks]

(a) Find mean and median. [2 marks]

(b) Find Q1, Q3, range, IQR. [2 marks]

4. Grouped waits have counts 6, 9, 5 in intervals $0 \le t < 5$, $5 \le t < 10$, $10 \le t < 15$. [4 marks]

Wait (min)	$0 \le t < 5$	$5 \le t < 10$	$10 \le t < 15$
Frequency	6	9	5

(a) What percentage waited less than 10 min? [2 marks]

(b) Why is the exact median unavailable? [2 marks]

5. Summaries are A(2, 5, 8, 13, 25), B(3, 7, 9, 11, 18). [4 marks]

(a) Which has lower median and which lower IQR? [2 marks]

(b) Give a qualified recommendation about faster service. [2 marks]

6. A sample has mean 12 min and sample SD 3 min. [4 marks]

(a) Interpret the SD. [2 marks]

(b) Convert both summaries to seconds. [2 marks]

7. The values are 5, 6, 7, 8, 34 minutes. [4 marks]

(a) Find mean and median. [2 marks]

(b) Find mean without 34 and explain what must justify excluding it. [2 marks]

8. Eighty customers are sampled but 20 do not respond. [4 marks]

(a) Calculate response rate. [2 marks]

(b) Why can non-response matter despite random initial selection? [2 marks]

9. A branch graph omits units and collection dates. [4 marks]

(a) Explain why each omission matters. [2 marks]

(b) Recommend two summaries for strongly skewed waiting times. [2 marks]

10. One week before and after a new system, waits decrease. The manager claims the system caused it. [4 marks]

(a) Give two alternative explanations. [2 marks]

(b) Suggest a stronger comparison. [2 marks]