Counting and statistics - Practice test 2

Name: _____ Date: _____

10 questions | 50 marks | 65 minutes

Apply restrictions, work from a frequency table and compare distributions. Normal cumulative values are supplied where needed.

Use a graphics calculator or appropriate digital tool for labelled tasks.

1. A four-digit number is made from digits 0-6 without repetition. [5 marks]

(a) Count all such four-digit numbers. [3 marks]

(b) Count the numbers ending in 0. [2 marks]

2. Six different people stand in a row; two named people must stand together. [5 marks]

(a) Count the rows. [3 marks]

(b) Count the rows if those two must instead occupy the two ends. [2 marks]

3. A panel of 3 is chosen from 6 adults and 4 students. [5 marks]

(a) Count panels with exactly 2 adults. [2 marks]

(b) Count panels with at least 1 student. [3 marks]

4. Consider $(2x-1)^5$. [5 marks]

(a) Find the coefficient of x^3. [3 marks]

(b) Find the sum of all coefficients. [2 marks]

5. A school has 420 juniors and 280 seniors. It wants a sample of 50. [5 marks]

(a) Allocate a proportional stratified sample. [2 marks]

(b) Describe a valid selection method and one possible source of remaining bias. [3 marks]

6. The table records the number of library visits per week in a sample. [5 marks]

Visits	0	1	2	3
Frequency	2	3	4	1

(a) Find the sample size and mean number of visits. [3 marks]

(b) Find the median and mode. [2 marks]

7. Group A has five-number summary $(4, 8, 12, 16, 24)$; Group B has $(6, 10, 15, 22, 30)$. [5 marks]

(a) Compare medians and IQRs with numerical evidence. [3 marks]

(b) Does the summary prove every B value exceeds every A value? Explain. [2 marks]

8. A sample contains 2,2,6,6. [5 marks]

(a) Calculate its mean and sample standard deviation to 3 decimal places. [3 marks]

(b) The readings are in metres. What unit belongs to the variance? [2 marks]

9. A normal model has mean 100 and standard deviation 10. Supplied values: $\Phi(1.5) = 0.93319$, $\Phi(-0.5) = 0.30854$. [5 marks]

(a) Find $P(95 < X < 115)$. [3 marks]

(b) Find the expected number in that interval among 800 items. [2 marks]

10. A company models completion time as normal with mean 40 min and sd 6 min. The standard-normal 90th percentile is 1.28155. [5 marks]

(a) Find the model's 90th-percentile completion time. [3 marks]

(b) A manager says every job must finish within that time. Evaluate the claim. [2 marks]