Revision Sheet

A-Level Further Mathematics · Unit 4 Further Probability & Statistics

6 vocabulary items · 29 marks of exam questions (4 questions)

Part 1 · Vocabulary review answer key. Section A wants the exact English spelling.

Question	Answer	Marks
1	probability density function	1
2	cumulative distribution function	1
3	confidence interval	1
4	goodness of fit	1
5	Wilcoxon signed-rank test	1
6	probability generating function	1

7	H_0: practical results and written results are equal H_1: practical results are greater than written results
	There are 10 + signs; B(15, 0.5) soi
	$(P(X \geqslant 10) = 1 - P(X \leqslant 9)$ =) 1 – 0.849 = 0.151
	Compare with 0.1: '0.151' > 0.1 accept H_0
	Insufficient evidence to suggest that practical results are greater than written results

8(a)	$[G_X(t) = \frac{1}{5} + pt + qt^2, \quad G'_X(t) = p + 2qt,] \quad p + 2q = 1.1$
	$\frac{1}{5} + p + q = 1, \quad p + q = \frac{4}{5}$ and solve
	$\left[p = \frac{1}{2}, \right] \quad q = \frac{3}{10}$
	$G''_X(t) = 2q = \frac{3}{5}$, $\text{Var}(X) = 0.6 + 1.1 - 1.1^2 = 0.49$

8(b)	$G_Z(t) = \left(\frac{1}{5}+\frac{1}{2}t+\frac{3}{10}t^2\right)\times\frac{2}{3}t\left(1+\frac{1}{2}t^2\right)$
	$\frac{1}{30}\left(4t+10t^2+8t^3+5t^4+3t^5\right)$
8(c)	$\frac{16}{30}=\frac{8}{15}$ oe
8(d)	(Z =) 2

9(a)	Signed differences 0.4 –1.1 0.8 –0.5 1.2 0.9 1.9 –0.3 –2.2 1.6 0.6 1.0
	Ranks: 2 –8 5 –3 9 6 11 –1 –12 10 4 7
	(P_+ = 54) P_- = 24
	H_0: population median = 22.0 H_1: population median ≠ 22.0
	Critical value from table = 17
	'24' > '17' Accept H_0
	Insufficient evidence to support (population) median not being 22.0 Insufficient evidence against the manager's claim
9(b)	Distribution is symmetric about the population median Underlying/population distribution is symmetric about the median

10(a)

Company	*Poor*	*Satisfactory*	*Good*
P	(18) 25	(43) 40.625	(64) 59.375
Q	(22) 15	(22) 24.375	(31) 35.625

Chi-squared contributions:

Company	*Poor*	*Satisfactory*	*Good*
P	1.96	0.1388	0.3603
Q	3.2667	0.2314	0.6004

Test statistic = 6.56

H_0: Quality (of items) is independent of company
H_1: Quality (of items) is not independent of company

$6.56 > 5.991$ Reject H_0

10(a)

There is sufficient evidence to suggest that the quality of brushes is not independent of company.

10(b)

P produces better quality brushes (than *Q*)
or *Q* produces worse quality brushes (than *P*)

P has fewer poor quality brushes than expected AND Q has more poor quality brushes than expected