



Cambridge International Examinations

Cambridge International Advanced Level

CANDIDATE NAME											
CENTRE NUMBER						CANDIDA ^T NUMBER	TE				
MATHEMATICS										97	09/72
Paper 7 Probab	ility & Sta	atistics 2	(S2)				Oc	tobe	r/Nov	embe	r 2017
								1	hour	15 m	inutes
Candidates ansv	wer on the	e Questi	on Pa	per.							
Additional Mater	ials:	List of F	ormul	lae (MF9	9)						

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer all the questions.

Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.

The use of an electronic calculator is expected, where appropriate.

You are reminded of the need for clear presentation in your answers.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The total number of marks for this paper is 50.



(a)	(i)	A random variable X has the distribution B(2540, 0.001). Use the Poisson approximation to the binomial distribution to find P($X > 1$).
	(ii)	Explain why the Poisson approximation is appropriate in this case. [
(b)		independent random variables, S and T , have distributions Po(2.1) and Po(3.5) respectively the mean and standard deviation of $S + T$.
	•••••	

2

The number of words in History essays by students at a certain college has mean μ and standard

	% confidence in	, , , , ,			
			•••••	•••••	
	•••••		•••••		
			•••••	•••••	•••••
					nple, a 95% con integer. Find th
interval for μ					
interval for μ					
interval for μ					
interval for μ					
interval for μ					
interval for μ					
interval for μ					
interval for μ					
interval for μ					

3	The masses, m kg, of pa 1.01 kg. A quality contro are summarised below.		•			
		n = 100	$\Sigma m = 98.2$	$\Sigma m^2 = 10$	4.52	

(i)	Test at the 5% significance level whether the population mean mass is less than 1.01 kg. [7]

(ii)	Explain whether it was necessary to use the Central Limit theorem in your answer to part (i).
	[1]

4	The random	variable X has	probability	density	function	given	by
---	------------	----------------	-------------	---------	----------	-------	----

ability density function given
$$f(x) = \begin{cases} \frac{k}{\sqrt{x}} & 0 < x \le a, \\ 0 & \text{otherwise,} \end{cases}$$

where k and a are constants. It is given that E(X) = 3.

(i)	Find the value of a and show that $k = \frac{1}{6}$.	[7]
		••••
		••••
		,
		••••

		•••
		•••
		•••
		•••
		•••
		•••
		•••
		,
		•••
(ii)	Find the median of X .	3]
		•••
		•••
		•••
		•••
		•••
		•••
		•••
		·••
		•••
		•••
		•••

Find the mark.	ie probability	that a randon	nly chosen _l	oaper 1 mark i	s more than a r	andomly chosen p
				•••••		
•••••			•••••	••••••	•••••	
				•••••	•••••	
•••••			•••••	•••••••••••••••••••••••••••••••••••••••	••••••	
			•••••		•••••	
	•••••					
•••••			•••••	••••••••••	••••••	•••••
		•••••			•••••	
••••••			••••••		••••••	
•••••				•••••		
					•••••	
•••••			•••••	••••••	•••••	
	••••					
•••••			•••••	•••••		

s 135. Find the proportion of students who gain a grade A.	I

6

After evel of de	the introduction of new quality controls, the management wished to test at the 10% significance whether the mean number of defective items had decreased. They noted the total number efective items produced in 5 randomly chosen days. It is assumed that defective items occurrently and that a Poisson model is still appropriate.
	Given that the total number of defective items produced during the 5 days was 2, carry out the test.

significance level. Find the probability of a Type I error. [3		
Explain what is meant by a Type I error	in this context.	I

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.