1 A random sample of 7 observations of a variable X are as follows.

8.26 7.78 7.92 8.04 8.27 7.95 8.34

The population mean of X is μ .

u < 8.22.	e level, the null hypothesis $\mu = 8.22$ against the a	[6]
State an assumption necessa	ary for the test in part (a) to be valid.	[1]
F	, p (a)	[
	(2 2	

A driving school employs four instructors to prepare people for their driving test. The allocation of people to instructors is random. For each of the instructors, the following table gives the number of people who passed and the number who failed their driving test last year.

	Instructor A	Instructor B	Instructor C	Instructor D	Total
Pass	72	42	52	68	234
Fail	33	34	41	58	166
Total	105	76	93	126	400

Test at the 10% significance level whether success in the driving test is independent of the instructor. [7]

Page 3 of 11	9231_s21_qp_41

Page 3 of 11

3 The continuous random variable X has cumulative distribution function F given by

$$F(x) = \begin{cases} 0 & x < 0, \\ \frac{1}{81}x^2 & 0 \le x \le 9, \\ 1 & x > 9. \end{cases}$$

Find $E(\sqrt{X})$.	
Find Var (\sqrt{X}) .	

2	on by $Y^3 = X$. Find the probability density function of Y .	[3
		••••••
		•
		•••••
		•
	11-5-22-14	

A scientist is investigating the lengths of the leaves of birch trees in different regions. He takes a random sample of 50 leaves from birch trees in region A and a random sample of 60 leaves from birch trees in region B. He records their lengths in cm, x and y, respectively. His results are summarised as follows.

$$\Sigma x = 282$$
 $\Sigma x^2 = 1596$ $\Sigma y = 328$ $\Sigma y^2 = 1808$

The population mean lengths of leaves from birch trees in regions A and B are μ_A cm and μ_B cm respectively.

Carry out a test at the 5% significance level to test the rhypothesis $\mu_A \neq \mu_B$.	null hypothesis $\mu_A = \mu_B$ against the alternative [8]

Page 7 of 11	9231_s21_qp_41
(2)	

5 Georgio has designed two new uniforms *X* and *Y* for the employees of an airline company. A random sample of 11 employees are each asked to assess each of the two uniforms for practicality and appearance, and to give a total score out of 100. The scores are given in the table.

Employee	A	В	C	D	E	F	G	Н	I	J	K
Uniform X	82	74	42	59	60	73	94	98	62	36	50
Uniform Y	78	75	63	56	67	82	99	90	72	48	61

(a)	Give a reason why a Wilcoxon signed-rank test may be more appropriate than a <i>t</i> -test investigating whether there is any evidence of a preference for one of the uniforms.	for [1]
		•••••
(b)	Carry out a Wilcoxon matched-pairs signed-rank test at the 10% significance level.	[7]
		•••••
		••••

9231_s21_qp_41

Tanji has a bag containing 4 red balls and 2 blue balls. He selects 3 balls at random from the bag,

a)	Find the probability generating function $G_X(t)$ of X .	[2]
		•••••
		•••••
	throws the two coins at the same time. The number of heads obtained is denoted by Y . Find the probability generating function $G_{ij}(t)$ of Y	[2]
	Find the probability generating function $G_{\gamma}(t)$ of γ .	[2]
		[2]
		[2]
		[2]
		[2]
		[2]
		[2]
		[2]
))		
he ota	Find the probability generating function $G_Y(t)$ of Y . Example 1. Find the probability generating function $G_Y(t)$ of Y . Example 2. Find the probability generating function $G_Y(t)$ of Y . Example 2. Find the probability generating function $G_Y(t)$ of Y .	r of head
he ota	Find the probability generating function $G_Y(t)$ of Y .	
he bta	Find the probability generating function $G_Y(t)$ of Y . Example 1. Find the probability generating function $G_Y(t)$ of Y . Example 2. Find the probability generating function $G_Y(t)$ of Y . Example 2. Find the probability generating function $G_Y(t)$ of Y .	r of head
he bta	Find the probability generating function $G_Y(t)$ of Y . Example 1. Find the probability generating function $G_Y(t)$ of Y . Example 2. Find the probability generating function $G_Y(t)$ of Y . Example 2. Find the probability generating function $G_Y(t)$ of Y .	r of head
b)	Find the probability generating function $G_Y(t)$ of Y . Example 1. Find the probability generating function $G_Y(t)$ of Y . Example 2. Find the probability generating function $G_Y(t)$ of Y . Example 2. Find the probability generating function $G_Y(t)$ of Y .	r of head

6

9231_s21_qp_41