A basketball club has a large number of players. The heights, $x$ m, of a random sample of 10 of the players are measured. A 90% confidence interval for the population mean height, $\mu$ m, of players this club is calculated. It is assumed that heights are normally distributed. The confidence interval $1.78 \le \mu \le 2.02$ .						
Find the values of $\sum x$ and $\sum x^2$	for this sample.			[		
				•••••		

In the colleges in three regions of a particular country, students are given individual targets to achieve. Their performance is measured against their individual target and graded as 'above target', 'on target' or 'below target'. For a random sample of students from each of the three regions, the observed frequencies are summarised in the following table.

		A	В	С	Total
	Above target	62	41	44	147
Performance	On target	102	94	95	291
	Below target	56	45	61	162
	Total	220	180	200	600

Test, at the 10% significance level, whether	performance is independent of region.	[7]
		•••••
		•••••
		••••••
		•••••
		•••••
		•••••

A scientist is investigating the masses of birds of a certain species in country *X* and country *Y*. She takes a random sample of 50 birds of this species from country *X* and a random sample of 80 birds of this species from country *Y*. She records their masses in kg, *x* and *y*, respectively. Her results are summarised as follows.

$$\Sigma x = 75.5$$
  $\Sigma x^2 = 115.2$   $\Sigma y = 116.8$   $\Sigma y^2 = 172.6$ 

The population mean masses of these birds in countries X and Y are  $\mu_x$  kg and  $\mu_y$  kg respectively.

Test, at the 5% significance level, the null hypothesis $\mu_x = \mu_y$ against the alternative hypothesis $\mu_x > \mu_y$ . State your conclusion in the context of the question. [8]

Page 4 of 10	9231_w22_qp_42
 785	

4 The continuous random variable X has probability density function f given by

$$f(x) = \begin{cases} k & 0 \le x < 1, \\ kx & 1 \le x \le 2, \\ 0 & \text{otherwise,} \end{cases}$$

where k is a constant.

(a)	Show that $k = \frac{2}{5}$ .	[1]
(b)	Find the interquartile range of $X$ .	[5]


+	The random variable $X$ is the number of 6s obtained when dice $A$ is thrown twice.	
a)	Find the probability generating function of $X$ .	[2]
		• • • • • • • • • • • • • • • • • • • •
		• • • • • • • • • • • • • • • • • • • •
f 6 he	second dice, <i>B</i> , with faces numbered 1, 2, 3, 4, 5, 6 is unbiased. The random variable <i>Y</i> is the second dice, <i>B</i> , with faces numbered 1, 2, 3, 4, 5, 6 is unbiased. The random variable <i>Y</i> is the second dice, <i>B</i> is thrown twice.  The random variable <i>Z</i> is the total number of 6s obtained when both dice are thrown twice.  Find the probability generating function of <i>Z</i> expressing your answer as a polynomial	
f 6	6s obtained when dice $B$ is thrown twice.	
f 6	6s obtained when dice $B$ is thrown twice. e random variable $Z$ is the total number of 6s obtained when both dice are thrown twice.	
f 6 he	6s obtained when dice $B$ is thrown twice. e random variable $Z$ is the total number of 6s obtained when both dice are thrown twice.	
f 6	6s obtained when dice $B$ is thrown twice. e random variable $Z$ is the total number of 6s obtained when both dice are thrown twice.	
f 6	6s obtained when dice $B$ is thrown twice. e random variable $Z$ is the total number of 6s obtained when both dice are thrown twice.	
f 6 The	6s obtained when dice $B$ is thrown twice. e random variable $Z$ is the total number of 6s obtained when both dice are thrown twice.	
of 6 The	6s obtained when dice $B$ is thrown twice. e random variable $Z$ is the total number of 6s obtained when both dice are thrown twice.	
of 6 The	6s obtained when dice $B$ is thrown twice. e random variable $Z$ is the total number of 6s obtained when both dice are thrown twice.	
of 6 Γhe	6s obtained when dice $B$ is thrown twice. e random variable $Z$ is the total number of 6s obtained when both dice are thrown twice.	
of 6 Γhe	6s obtained when dice $B$ is thrown twice. e random variable $Z$ is the total number of 6s obtained when both dice are thrown twice.	
of 6 Γhe	6s obtained when dice $B$ is thrown twice. e random variable $Z$ is the total number of 6s obtained when both dice are thrown twice.	
of 6 Γhe	6s obtained when dice $B$ is thrown twice. e random variable $Z$ is the total number of 6s obtained when both dice are thrown twice.	[3]
of 6 Γhe	6s obtained when dice $B$ is thrown twice. e random variable $Z$ is the total number of 6s obtained when both dice are thrown twice.	

			•••••			
			•••••			
	,	,	•••••	•••••	•••••	
	••••					
•••••	,	,	•••••	•••••	•••••	
			••••••		•••••	
		•••••	•••••			
	,	,	•••••	•••••	•••••	
Jse the p	probability generate	ating function of	fZ to find the	most probable v	value of $Z$ .	

	npany $A$ npany $B$	461 454	482 506	374 491	512 384	415 361	452 443	502 401	427 472	398 414	545 342	612 355	3.5 4.5
(a)	Carry out claim is su	a Wilc upported	oxon rad by the	nk-sum data.	n test at	the 5%	signif	icance	level to	test wl	nether t	he mana	age:
						•••••						•••••	
		•••••	•••••	•••••									
						•••••							•••••
		•••••	•••••	•••••									
													•••••
													•••••
													•••••

(b)	Explain whether a paired sample <i>t</i> -test would be appropriate to test the manager's claim if earnings are normally distributed. [1]

Page 10 of 10

9231\_w22\_qp\_42