









Leave  
blank

3. The product moment correlation coefficient is denoted by  $r$  and Spearman's rank correlation coefficient is denoted by  $r_s$ .

(a) Sketch separate scatter diagrams, with five points on each diagram, to show

(i)  $r = 1$ ,

(ii)  $r_s = -1$  but  $r > -1$ .

(3)

Two judges rank seven collie dogs in a competition. The collie dogs are labelled  $A$  to  $G$  and the rankings are as follows

| Rank    | 1   | 2   | 3   | 4   | 5   | 6   | 7   |
|---------|-----|-----|-----|-----|-----|-----|-----|
| Judge 1 | $A$ | $C$ | $D$ | $B$ | $E$ | $F$ | $G$ |
| Judge 2 | $A$ | $B$ | $D$ | $C$ | $E$ | $G$ | $F$ |

(b) (i) Calculate Spearman's rank correlation coefficient for these data.

(6)

(ii) Stating your hypotheses clearly, test, at the 5% level of significance, whether or not the judges are generally in agreement.

(5)















Leave blank

6. Ten cuttings were taken from each of 100 randomly selected garden plants. The numbers of cuttings that did not grow were recorded.

The results are as follows

|                                    |    |    |    |    |    |   |   |   |            |
|------------------------------------|----|----|----|----|----|---|---|---|------------|
| No. of cuttings which did not grow | 0  | 1  | 2  | 3  | 4  | 5 | 6 | 7 | 8, 9 or 10 |
| Frequency                          | 11 | 21 | 30 | 20 | 12 | 3 | 2 | 1 | 0          |

- (a) Show that the probability of a randomly selected cutting, from this sample, not growing is 0.223

(2)

A gardener believes that a binomial distribution might provide a good model for the number of cuttings, out of 10, that do not grow.

He uses a binomial distribution, with the probability 0.2 of a cutting not growing. The calculated expected frequencies are as follows

|                                    |     |       |     |       |      |           |
|------------------------------------|-----|-------|-----|-------|------|-----------|
| No. of cuttings which did not grow | 0   | 1     | 2   | 3     | 4    | 5 or more |
| Expected frequency                 | $r$ | 26.84 | $s$ | 20.13 | 8.81 | $t$       |

- (b) Find the values of  $r$ ,  $s$  and  $t$ .

(4)

- (c) State clearly the hypotheses required to test whether or not this binomial distribution is a suitable model for these data.

(2)

The test statistic for the test is 4.17 and the number of degrees of freedom used is 4.

- (d) Explain fully why there are 4 degrees of freedom.

(2)

- (e) Stating clearly the critical value used, carry out the test using a 5% level of significance.

(3)

---

---

---

---

---

---

---

---

---

---







