BERNOULLI TRIALS

1 In an examination there are 10 multiple-choice questions with four possible answers, only one of which is correct.

(a) If you just guess your answers, does this form a sequence of Bernoulli trials?

(b) Use Pascal's triangle (or the binomial expansion) to calculate the number of different ways you could get 6 out of the 10 questions correct.

a) Yes, as there are only 2 outcomes, correct or incorrect

b) That's ${}^{10}C_6 = 210$

Note: also equal to ${}^{10}C_4$ (number of combinations possible to have 4 incorrect, i.e. the 6 others are correct).

2 At the recent local government elections, 20 people are selected at random after leaving the polling booth and asked if they have voted for a particular candidate. Would the list of responses represent a Bernoulli trial?

Yes: the outcomes would be "voted for" or "didn't vote for" the candidate.

3 The babies born at a hospital in one month have their sex recorded as 'male' or 'female'.

(a) Would the list of sexes represent a Bernoulli trial?

(b) In 20 births at the hospital during the month, 11 are male. Use Pascal's triangle (or the binomial expansion) to calculate the number of different ways this result could occur.

a) Yes: 2 outcomes male or female

b) ${}^{20}C_{11} = 167,960$

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4 A coin is tossed four times.

(a) Would the list of outcomes represent a Bernoulli trial?

(b) If the possible outcomes are recorded as H (heads) or T (tails), list all possible sets of outcomes with at least three heads.

a) Yes - only outcomes are Heads or Tails.

b) HHHH
HHHT
HHTH
HTHH
THHH so 5

5 Two standard dice are rolled together and the sum of the numbers rolled is noted. The result is recorded as either 7 or not 7.

(a) Does this experiment represent a Bernoulli trial?

(b) If p is the probability of a sum of 7, find the value of p.

(c) In 36 rolls of the dice, how many times would you expect the sum to be 7?

a) Yes, the outcomes are "a sum of 7" or "not a sum of 7"

b) Possible combinations are 1+6, 2+5, 3+4, 4+3, 5+2, 6+1 so 6 in total.

$$p = \frac{6}{36} = \frac{1}{6}$$

c) 6