IMPROBABLE PROBABILITIES

Boys and Girls In a certain country the number of boys born is approximately equal to the number of girls born. Then the following statements are true for the set of families with two children:

(i) the probability that any family from the set will have 1 boy and 1 girl is ½.
(ii) the probability that a family from the set will have 1 boy and 1 girl, if we know that the family has 1 girl, is 2/3.
(iii) the probability that a family from the set will have 1 boy and 1 girl, if we know that the elder child is a girl, is ½.
(iv) if we pick 6 families at random from the set the probability that exactly 3 of them will have 1 boy and 1 girl is $5/16 < 1/3$.
(v) if we pick 12 families at random from the set the probability that exactly 6 of them will have 1 boy and 1 girl is $231/1024 < \frac{1}{4}$.

Birthdays There are ten people in a room, none of whom was born on 29th February. The probability that there is at least one pair with the same birthday is 0.117. If there are 20 people in the room, then the probability is 0.411. If there are 23 people in the room, then the probability is 0.507 - just over even odds.

(Explanation in Vol 8 No 1)

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A trick Ask a friend to choose any number less than 1000. Then get your friend to tell you the remainders when he or she divides it by 7, by 11 and by 13. You will then be able to tell your friend the number he or she chose, after a few calculations, thus:

Multiply the first remainder by 715, the second by 364 and the third by 924. Add these together and reduce the answer to a least residue (see Vol 7 No 1) modulo 1001. This will be the number chosen.

Example Number chosen = 632. Remainders are 2, 5, 8. $2\times715 = 1430$; $5\times364 = 1820$; $8\times924 = 7392$. Total = 10642. Now divide by 1001 to get remainder 632.

(Would any reader care to submit a short explanation of the trick for publication? - Ed.)

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