

Represent your answer using expressions with fractions, decimals, and/or exponents. Also represent your answer as a decimal using enough decimal places to show at least three non-zero digits.

1. The Federal Railroad Administration found that for a recent year, human error was cited as a cause in 24% of all derailments. A railroad safety specialist randomly selected records from 5 different derailment incidents. What is the probability that all 5 were caused by human error?

$$(0.24)^5 = 0.000796$$

2. One couple attracted media attention when their 3 children, born in different years, were all born on July 4. Ignoring leap years, find the probability that 3 randomly selected people were all born on July 4.

$$\left(\frac{1}{365}\right)^3 = 0.000000021$$

3. The Locust Tree Restaurant has found that 65% of its reservations are for nonsmoking tables, while 35% are for tables for smoking. Find the probability that 4 randomly selected reservations are all for nonsmoking tables.

$$(0.65)^4 = 0.179$$

4. A Baltimore detective is suspicious about 5 deaths that were determined to be accidental. If a death is selected at random, there is a .0478 probability that it was caused by an accident. Find the probability that 5 randomly selected deaths were all accidental.

$$(0.0478)^5 = 0.00000025$$

5. The Atlantic Delivery Company has 12 trucks. When 3 are inspected, it is found that all 3 have faulty brakes. The owner claims that all of the other trucks have good brakes and that it was just chance that led to selecting the trucks with faulty brakes. Find the probability of that event, assuming that the owner's claim is correct.

claim: 3 faulty out of 12
only

$$\frac{3}{12} \cdot \frac{2}{11} \cdot \frac{1}{10} = \frac{6}{1320} = 0.00455$$

6. In a Riverhead, New York, case, 9 different crime victims listened to voice recordings of 5 different men. All 9 victims identified the same voice as that of the criminal. If the voice identifications were made by random guesses, find the probability that all 9 victims would select the same person.

$$\left(\frac{1}{5}\right)^9 = 0.000000512$$

7. The Scott Computer Mail Order Company normally experiences a 20% reply rate on a coupon it mails. There is concern about the status of 1 batch of 6 coupons that resulted in no returns. What is the probability of this happening by chance if the coupons were delivered and the overall reply rate really is 20%?

80% "no-reply rate"

$$(0.8)^6 = 0.262144$$

8. Suppose that each student at a certain school is assigned an identification card which contains a unique 4 character (letter and digit) barcode. Each barcode contains at most 1 digit. How many unique identification cards are possible?

$$4 \cdot 10 \cdot 26^3 + 26^4 = 1,160,016$$

9. In a recent national election, 52% of the voters were women. For a random selection of 4 voters, find the probability of getting at least 1 woman.

$$P(\text{one man}) = 0.48$$

$$P(4 \text{ men}) = 0.48^4$$

$$P(\text{at least one woman}) = 1 - 0.48^4$$

not 4 men

$$= 0.95$$

10. If the probability that Mrs. Fuston will sing in class is 0.26, what is the probability that she won't sing in class?

$$1 - 0.26 = 0.74$$