

Solutions to Math 481 Attendance QUIZ for Lecture 2

1. Four women met by chance.

a. What is the probability that they were all born in the same month?

Sol. of a:

- The probability of any one of them being born in January is $\frac{1}{12}$ (assuming all months are equally long)
- The probability that all four of them were born in January is $(\frac{1}{12})^4$, since these are independent events.

Similarly for any specific month (of course these are approximations, for Feb. it is less).

Since these events are **mutually exclusive** the desired prob. is $12 \cdot (\frac{1}{12})^4 = (\frac{1}{12})^3$.

Ans. to a:

$$\frac{1}{12^3} \quad .$$

b. What is the probability that they were all born in different months?

Sol. to b: pick any woman as the “pivot”. Order them in any arbitrary order. The prob. that the second woman was born in a different month is $\frac{11}{12}$, the prob. that the third woman is different than the above two is $\frac{10}{12}$, the prob. that the fourth woman is different than the above two is $\frac{9}{12}$.

The prob. that it all happened is the **product**

$$\frac{11}{12} \cdot \frac{10}{12} \cdot \frac{9}{12} = \frac{55}{96} \quad .$$

Ans. to b: $\frac{55}{96}$.

Note: In a test you can leave it as $\frac{11}{12} \cdot \frac{10}{12} \cdot \frac{9}{12}$.