MATH 135A QUIZ 1 OCTOBER 10, 2019

Name: Section A01

1. (10 points) A jar contains a a 4-sided die (a tetrahedron) and a 6-sided die. We uniformly at random pick a die out of the jar and roll it. We observe the number on the lower face of the die.

   (a) Describe the sample space.

$$\Omega = \{1, 2, 3, 4, 5, 6\}$$

   (b) What is the probability that the lower face is bigger than 3?

A: Lower face > 3

B_4: Picked 4-sided die $\quad B_6$: Picked 6-sided die

$$P(A) = P(A \mid B_4)P(B_4) + P(A \mid B_6)P(B_6)$$

$$= \frac{1}{4} \cdot \frac{1}{2} + \frac{1}{2} \cdot \frac{1}{2} = \boxed{\frac{3}{8}}$$

   (c) Assuming the roll is a 3, what is the chance we picked the 6-sided die?

A: Lower face $= 3$

$$P(B_6 \mid A) = \frac{P(B_6) \cdot P(A \mid B_6)}{P(A \mid B_4)P(B_4) + P(A \mid B_6)P(B_6)} = \frac{\frac{1}{2} \cdot \frac{1}{6}}{\frac{1}{4} \cdot \frac{1}{2} + \frac{1}{6} \cdot \frac{1}{2}} = \frac{\frac{1}{6}}{\frac{1}{4} + \frac{1}{6}} = \frac{\frac{1}{6}}{\frac{10}{24}}$$

$$= \frac{24}{10} \cdot \frac{1}{6} = \boxed{\frac{2}{5}}$$