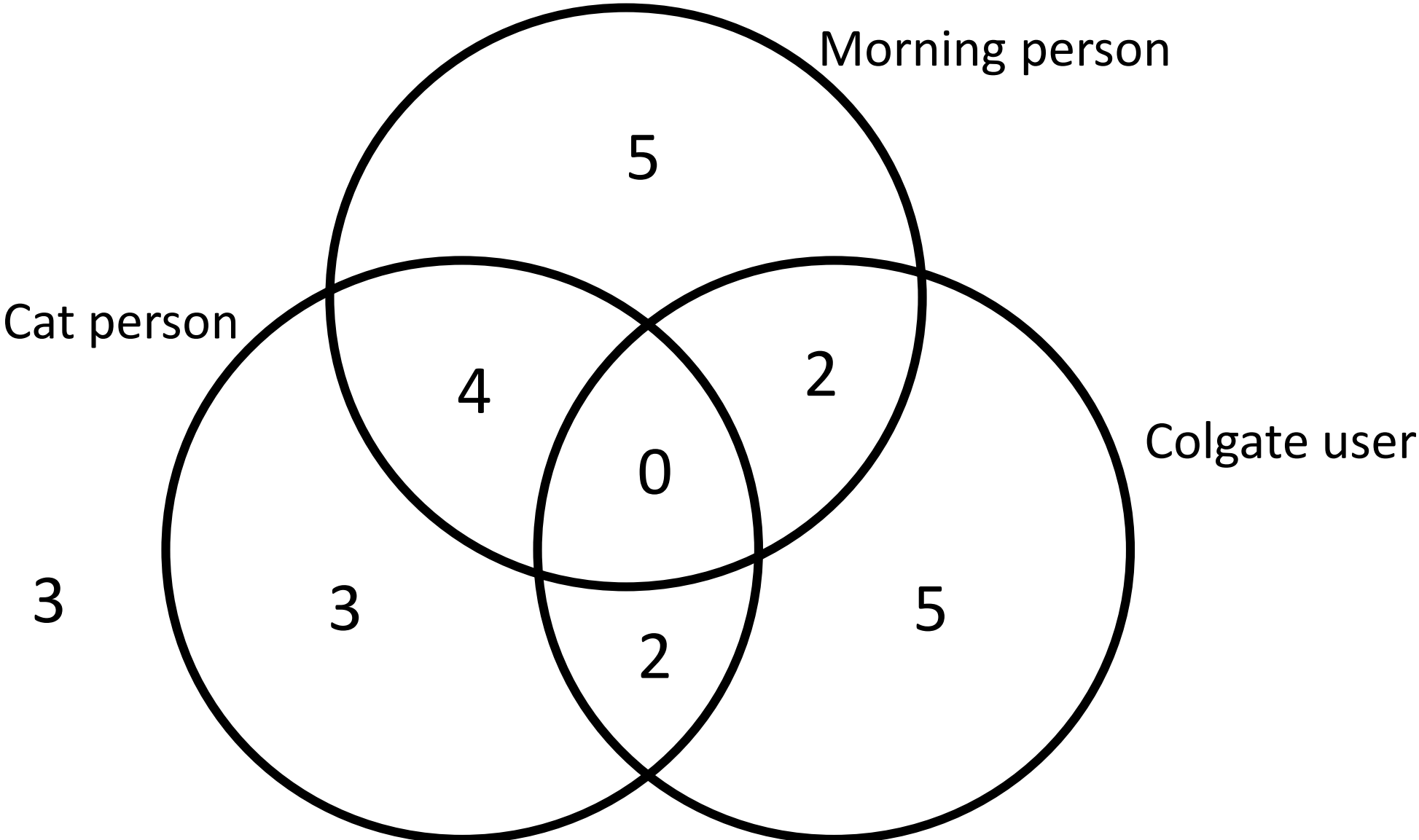


# Probability rules

1. For any event  $A$ ,  $0 \leq P(A) \leq 1$ ,
2. When each outcome is equally likely,  $P(A) = \frac{\text{the number of outcomes in } A}{\text{the total number of outcomes}}$ .
3.  $P(\text{something happens}) = 1$ .
4. If  $A$  and  $B$  are disjoint,  $P(A \text{ or } B) = P(A) + P(B)$ .
5.  $P(A \text{ doesn't happen}) = P(A^C) = 1 - P(A)$ .
6. If  $A$  and  $B$  are independent,  $P(A \text{ and } B) = P(A) * P(B)$ .
7.  $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$  whether or not  $A$  and  $B$  are disjoint.
8.  $P(B \text{ given } A) = P(B|A) = \frac{P(A \text{ and } B)}{P(A)}$ .
9.  $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$  whether or not  $A$  and  $B$  are independent.
10.  $A$  and  $B$  are independent exactly when  $P(B|A) = P(B)$  and  $P(A|B) = P(A)$ .

# Venn diagrams



# More probability problems

1. What's the probability that someone in the class is either a morning person or a cat person?
2. What's the probability that a person in the class is both a cat person and a morning person?
3. What's the probability that a morning person in the class is also a cat person?