

Green Mathematics for Machine Learning

Bayesian Creatures

Lesson 2: Sets, Worksheet 1

1) $S = \{a, b, c\}$, $T = \{1, 2, 3\}$

What is $S \cup T$?

- $S \cup T = \{a, b, c, 1, 2, 3\}$

2) $S = \{a, b, c\}$, $T = \{1, 2, 3\}$

Why is $S \cap T$ the empty set?

- S and T have no elements in common.

3) If the set of mammals is M , and the set of two-legged animals is T :

What is the set of all two-legged mammals?

- $M \cap T$

4) $S = \{1, 2, 3, 4\}$ and $T = \{3, 4, 5, 6\}$

What is $S \cap T$?

- $S \cap T = \{3, 4\}$

5) $A = \{1, 2, 3\}$, $B = \{1, 2, 3, 4\}$, $C = \{3, 4, 5\}$

What is $(A \cap B) \cup (B \cap C)$?

- $A \cap B = \{1, 2, 3\}$
- $B \cap C = \{3, 4\}$
- $\{1, 2, 3\} \cup \{3, 4\} = \{1, 2, 3, 4\}$

6) **What does “ $p(X|Y)$ ” mean?**

- The probability of X given Y

7) $A = \{a, b, c, d, e\}$
 $B = \{c, d, f\}$

What is $p(A|B)$?

- $|A \cap B|$ divided by $|B|$
- $|A \cap B| = 2$, $|B| = 3$
- $p(A|B) = 0.667$ or two-thirds

8) $A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$.
 $B = \{2, 4, 6, 8, 10\}$

What is $p(B|A)$?

- $|A \cap B|$ divided by $|A|$
- $|A \cap B| = 5$, $|A| = 10$
- $p(A|B) = 0.5$ or one-half

9) $S = \{a, b, c, d, e\}$

Is $b \in S$?

- Yes.

10) $T = \{1, a, 2, b, 3, c\}$

Is $2 \notin T$?

- No. 2 is a member of T .