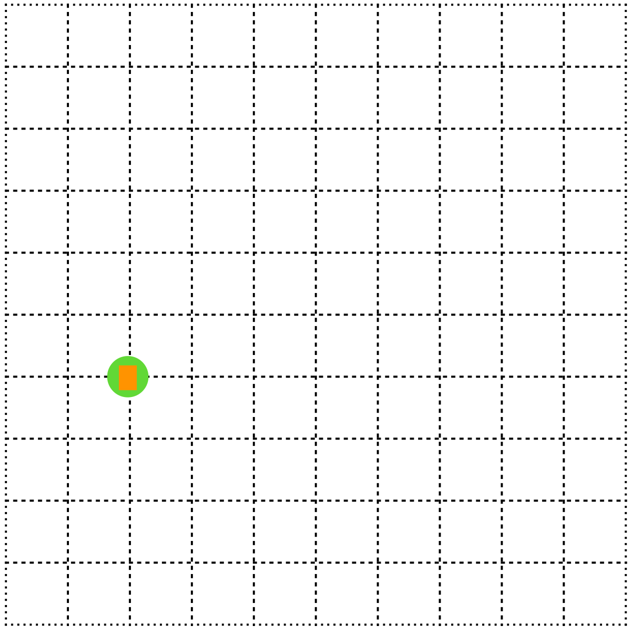
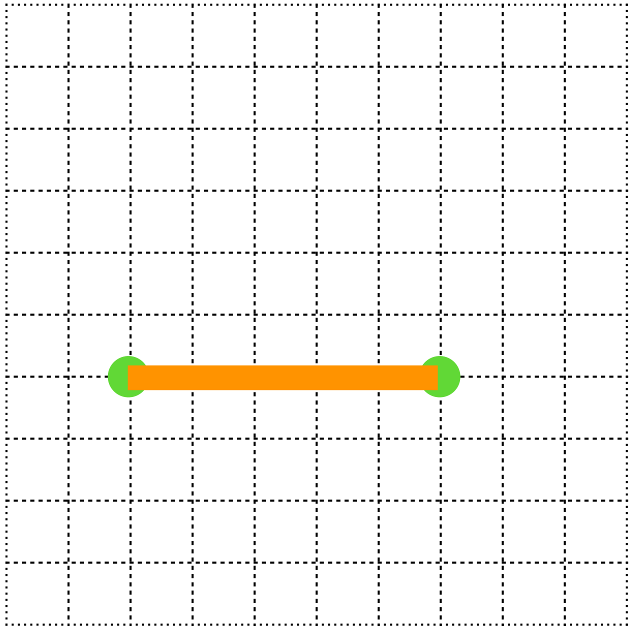
Answers

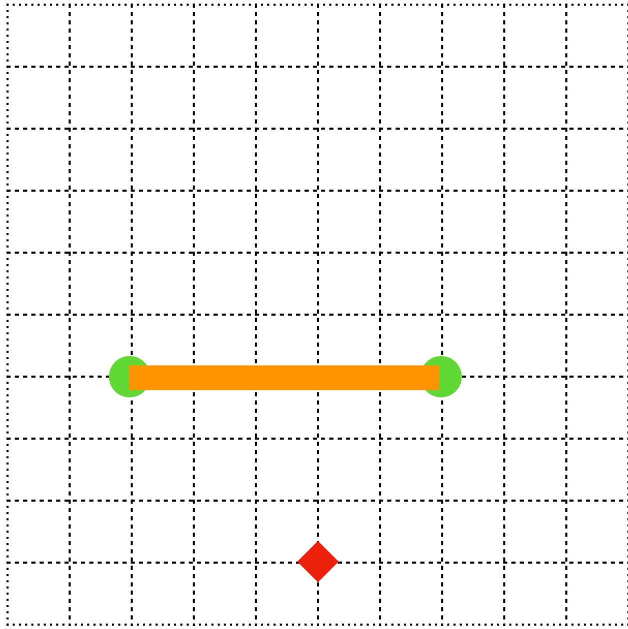
FIND-S Trace



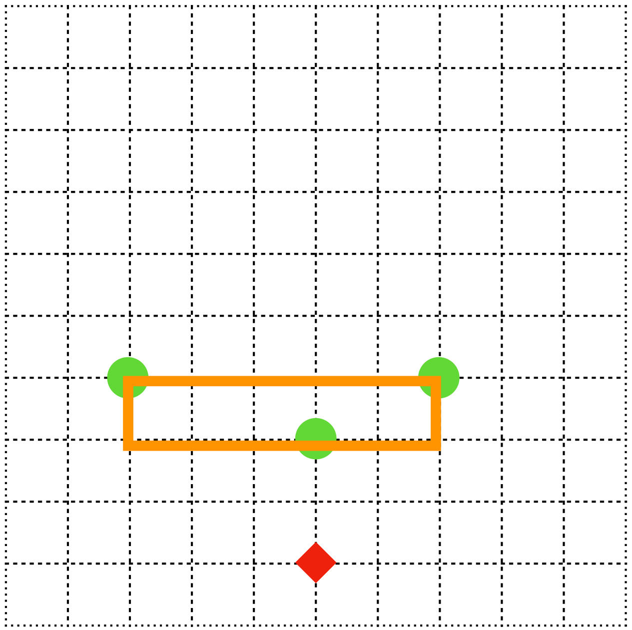
$2 \leq x \leq 2 \wedge 4 \leq y \leq 4$



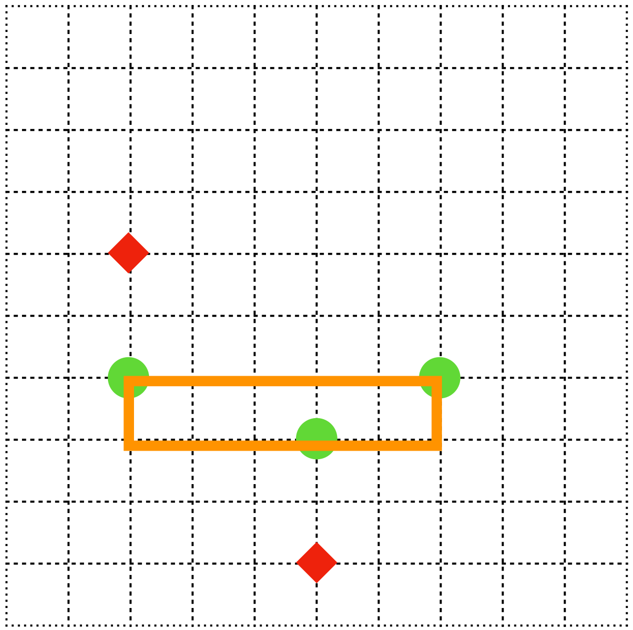
$2 \leq x \leq 7 \wedge 4 \leq y \leq 4$



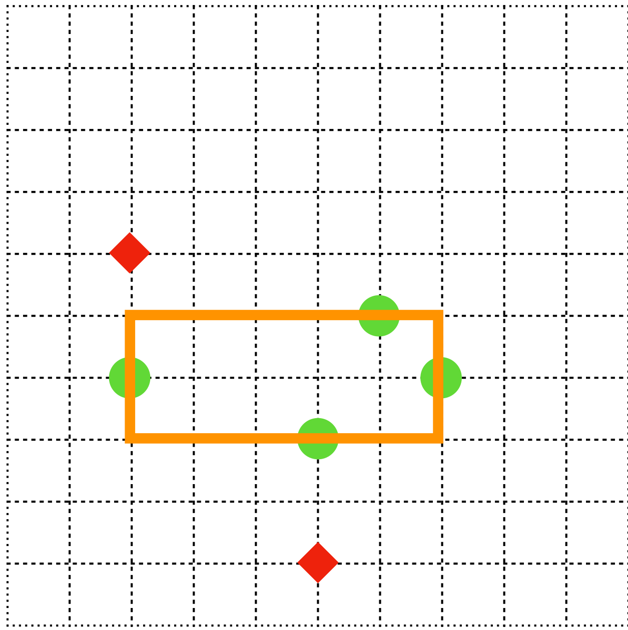
$2 \leq x \leq 7 \wedge 4 \leq y \leq 4$



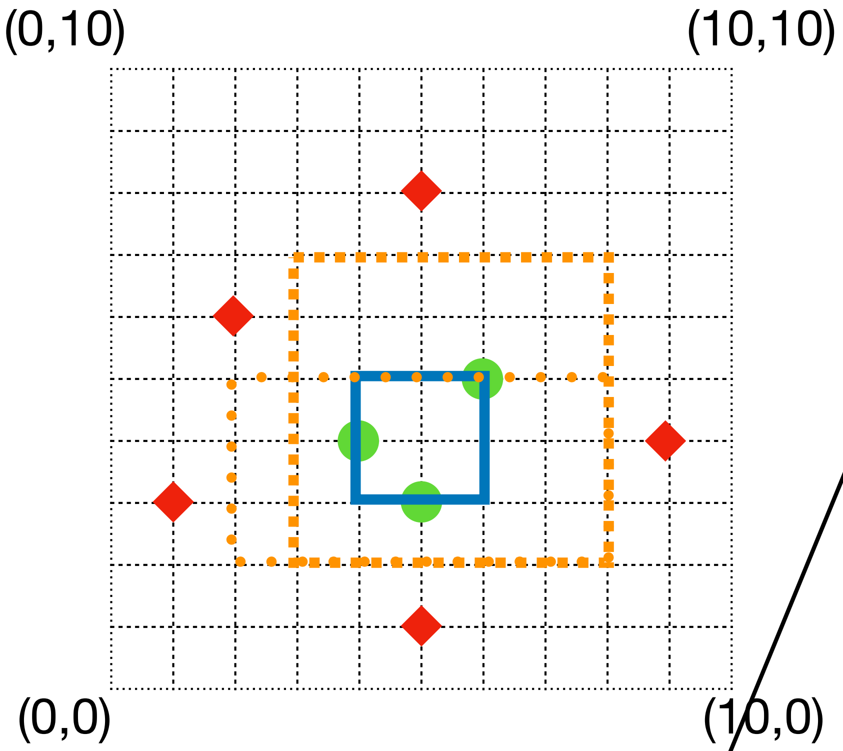
$2 \leq x \leq 7 \wedge 3 \leq y \leq 4$



$2 \leq x \leq 7 \wedge 3 \leq y \leq 4$



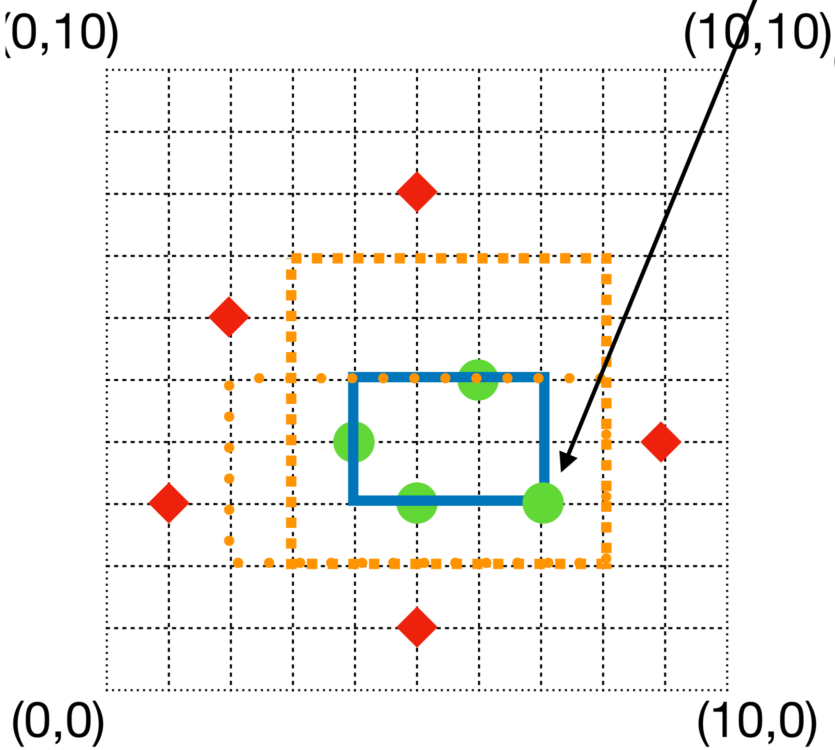
$2 \leq x \leq 7 \wedge 3 \leq y \leq 5$

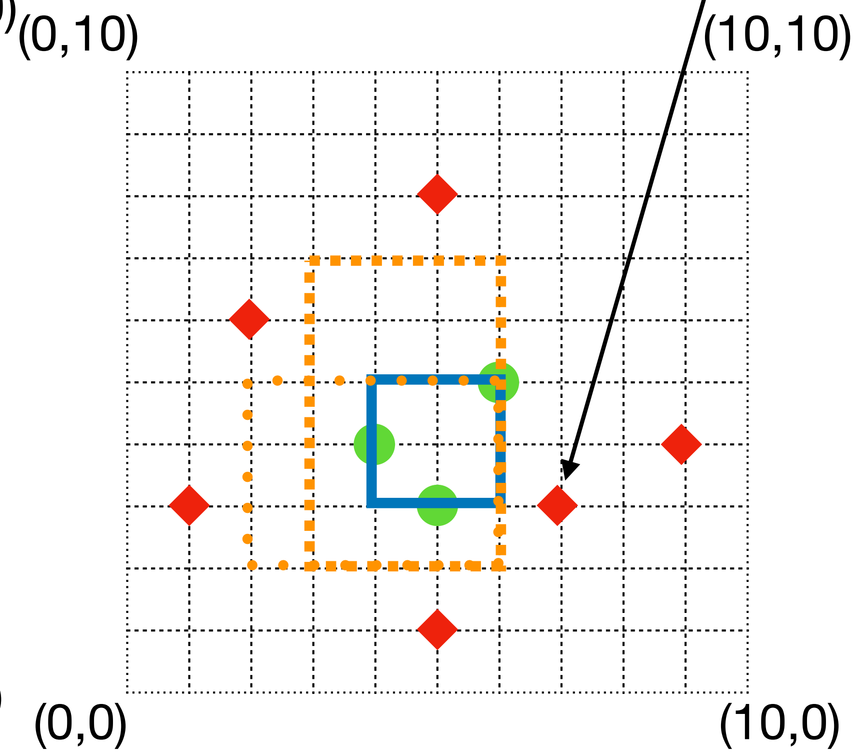


$S = \{((4 \le x \le 6) \wedge (3 \le y \le 5))\}$

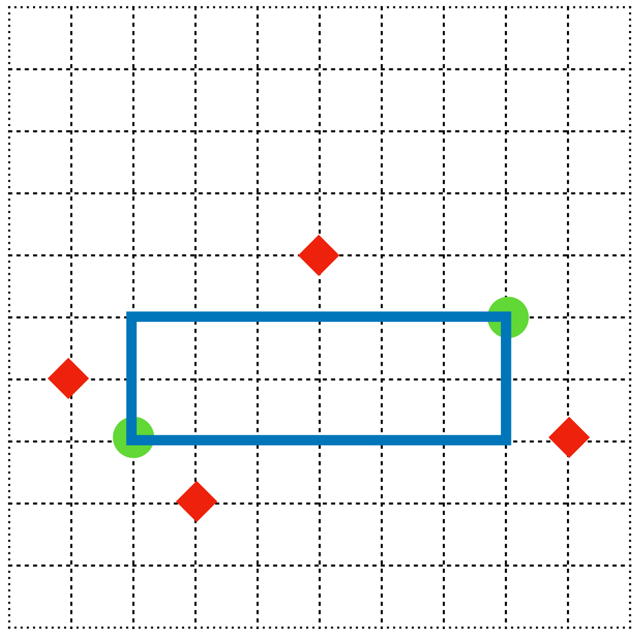
$G = \{((2 \le x \le 8) \wedge (2 \le y \le 5)), ((3 \le x \le 8) \wedge (2 \le y \le 7))\}$

To guarantee that the version space shrinks, we need a new training example that if labeled positive will generalise S (i.e., make the blue rectangle larger) and if labeled negative will specialise G (i.e., make at least one of the yellow rectangles smaller), e.g., (7,3)

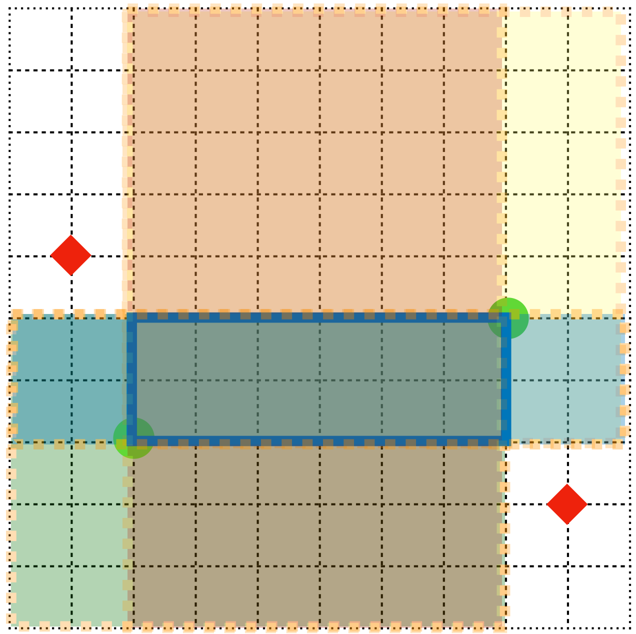




Assuming that the target function is indeed a rectangle and the data is labeled correctly, any point inside the blue rectangle or outside both yellow ones will not change the version space.



The minimal number of examples to exactly teach CANDIDATE-ELIMINATION a target rectangle (i.e., to reach S=G) is six: two positives on opposite corners of the rectangle to generalise S, and four negatives just outside the four sides to specialise G



Note that for the negatives, two examples at the corners are not enough to collapse G onto a single rectangle, as the algorithm uses **minimal** specialisations of G

G = {((0≤x≤8)∧(0≤y≤5)), ((2≤x≤10)∧(3≤y≤10)), ((2≤x≤8)∧(0≤y≤10)), ((0≤x≤10)∧(3≤y≤5))}