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Goals: • Deduce new truths
• Use set builder notation appropriately

Quiz Reminder

Another logical symbol: $\equiv$ "is equivalent to" $\equiv$ same operator as $\leftrightarrow$

Deduction: assumed true statements → new true statements

- If you graduated, you passed a swim test. (P → Q) $= T$
- You graduated (P) $= T$

} Premises (assume true, although can be false)

$\therefore$ You passed a swim test. $= T$ } Conclusion

$$\frac{P \to Q \quad P}{\therefore Q}$$

"Therefore" $\therefore$

If $P \to Q$ is true and P is true, Q must be true

2 Strategies

1. Truth table. Cross out false rows, see what is left

P	Q	P → Q
T	T	T
T	F	F
F	T	T
F	F	T

← This row is true. Q=T is new info.

Because P → Q is true

} Because P = T

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2. Reason it out:

If P is true and $P \rightarrow Q$ is true then Q must be true because otherwise $T \rightarrow F \equiv F$

Q: Deduce using a truth table or reasoning:

Layla has black pants and pink pants. They always wear pink pants OR they wear sandals. If they wear pink pants and a green shirt, they don't wear a bow tie. They never wear pink pants unless they also wear a green shirt OR sandals. If they wear sandals, they also wear a green shirt. Yesterday, Layla wore a bow tie. What else did they wear?

OR=V (logical or)

Solve using truth table and/or reasoning

OR= logical or

P = pink pants

G = green shirt

S = sandals

B = bow tie

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P = pink pants
G = green shirt
S = sandals
B = bow tie

⇒

1. $P \vee S$
2. $P \wedge G \rightarrow \neg B$
3. $P \rightarrow (G \vee S)$
4. $S \rightarrow G$
5. B

2.
5.

$\therefore P \wedge G = F$

or

$P = F$
1

$\therefore S$

S
4.

$\therefore G$

S, G, B, ¬P

$G = F$
4.

$\therefore \neg S$ $(S = F)$

¬S
1.

$\therefore P$

¬S
P
3

$\therefore G = T \rightarrow X$

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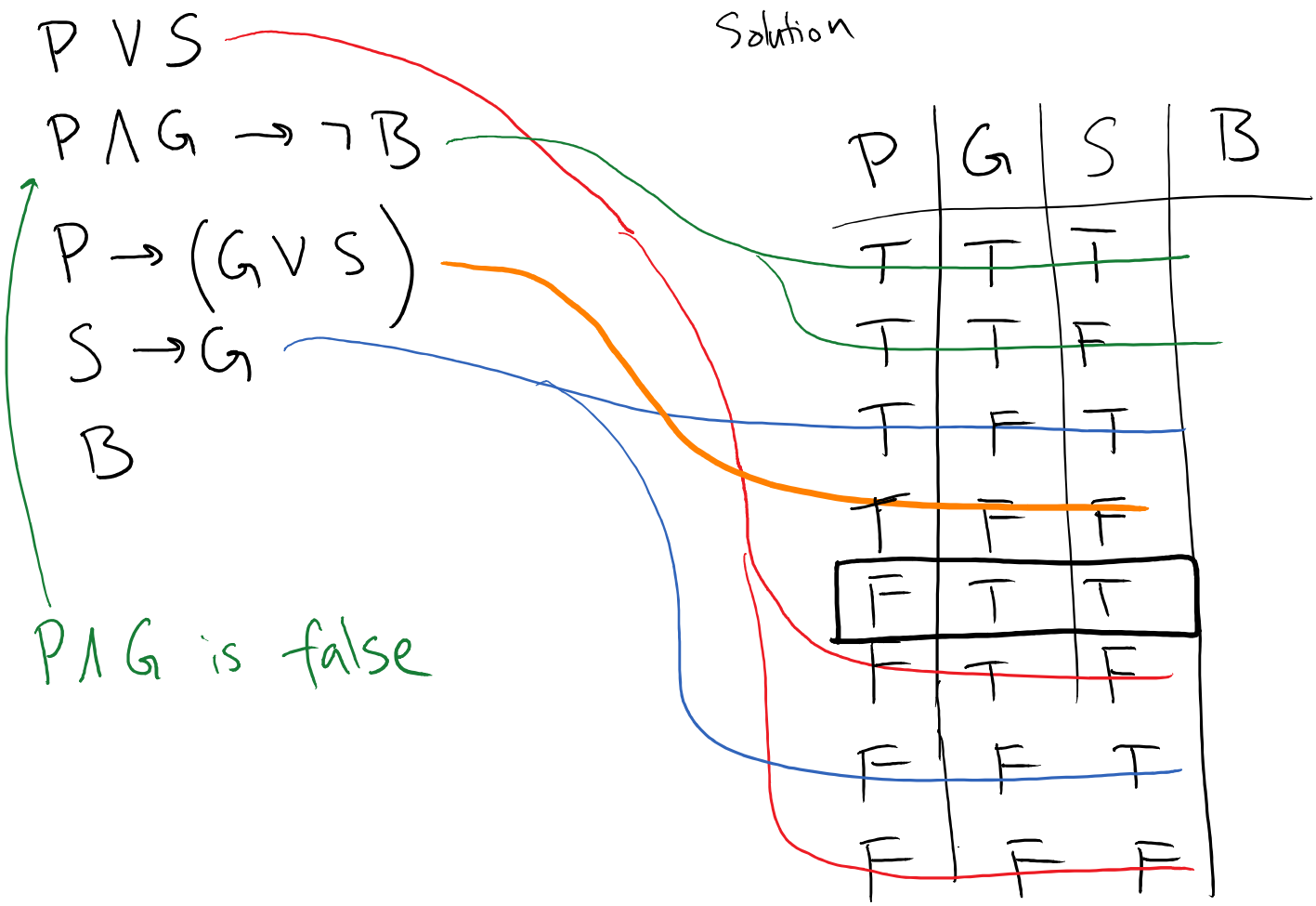
P ∨ S
P ∧ G → ¬ B
P → (G ∨ S)
S → G
B
P ∧ G is false
Solution
P G S B
T T T
T T F
T F T
T F F
F T T
F T F
F F T
F F F