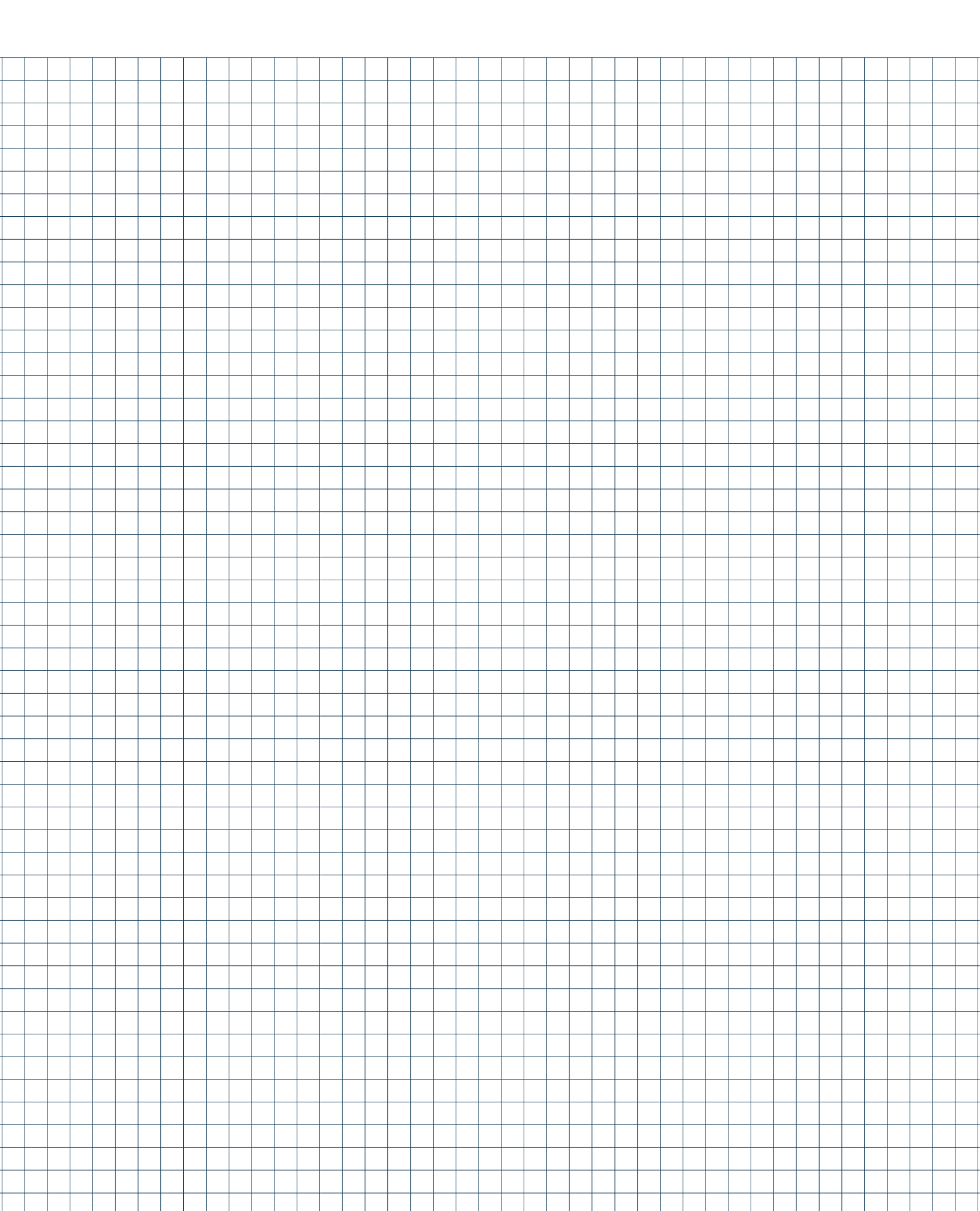


Today: Canvas worksheet

Files > Discussion Docs

1. Write the truth table for the Boolean function Maj_3 , which takes 3 arguments and returns true if at least two of its arguments are true and returns false if at least two of its arguments are false.

P	Q	R	$Maj_3(P, Q, R)$
T	T	T	T
T	T	F	T
T	F	T	T
T	F	F	F
F	T	T	T
F	T	F	F
F	F	T	F
F	F	F	F



2. Use your truth table from the previous problem to write Maj_3 using only \wedge , \vee and \neg . Use the same idea to write \implies using only \wedge , \vee and \neg .

P	Q	$P \implies Q$	
T	T	T	$(P \implies Q)$
T	F	F	$(P \wedge \neg Q)$
F	T	T	$(\neg P \wedge Q)$
F	F	T	$(\neg P \wedge \neg Q)$

$$P \implies Q = (P \wedge Q) \vee (\neg P \wedge Q) \vee (\neg P \wedge \neg Q)$$

$$= \neg (P \wedge \neg Q)$$

4. Let $A = \{1, 2, \{3, 4\}\}$. Which of the following are true and which are false?

- (a) $1 \in A$.
- (b) $\{1\} \in A$.
- (c) $3 \in A$.
- (d) $\{3\} \in A$.
- (e) $\{3\} \subseteq A$.

$$A = \{1, 2, \{3, 4\}\}$$

a) \neg

b) "the set containing"

F

$$A(Q)$$

$$P \wedge \neg Q \vee$$

$$P \wedge Q \vee$$

$$P \wedge \neg Q$$

$$(\neg P \wedge \neg Q)$$

$$\{4\}, \{\underline{1}\}$$

\Rightarrow an element!

$$A''$$

c) F A has three elements; the

none of these

$$3 \notin A$$

e) $B \subseteq A$ & every elt. of B
A

is

$$\{3, 4\} \subseteq A? \quad F$$

$$\{\{3, 4\}\} \subseteq A? \quad T$$

what are the subsets of $\{\{3, 4\}\}$

The subsets are $\{\{3, 4\}\}$,

✓ one 1, 2, 3
{3, 4}
is 3

is an elt of

{3, 4}

✓