MITx 6.004.1x
Computation Structures 1: Digital Circuits

Help selfpoised

Course Progress Dates Course Notes Discussion

Course / 4. Combinational Logic / Lecture Videos (47:49)

Previous Next

LE4.5

Bookmark this page

Calculator

LE4.5.1: 2-input functions

4/4 points (ungraded)

Consider the 2×2 K-map needed to hold the truth table for a 2-input Boolean function.

If the truth table for the 2-input function contained only a single "1" in the output column, what is the maximum number of prime implicants that could be circled in the corresponding K-map?

Maximum number of prime-implicants: 1 ✔

If the truth table for the 2-input function contained exactly two "1s" in the output column, what is the maximum number of prime implicants that could be circled in the corresponding K-map?

Maximum number of prime-implicants: 2 ✔

If the truth table for the 2-input function contained exactly three "1s" in the output column, what is the maximum number of prime implicants that could be circled in the corresponding K-map?

Maximum number of prime-implicants: 2 ✔

If you only had a supply of 2-input NAND gates to build a circuit, what is the *minimum* number of 2-input NANDs you would need to implement any arbitrary 2-input Boolean function? Hint: think about your answers to the questions above and what they imply about a minimal sum-of-products expression for an arbitrary 2-input function. Then think about how to implement a sum-of-products circuits using only NANDs.

Minimum number of 2-input NANDs needed: 5 ✔

Submit

LE4.5.2: Minimal Sum Of Products

3/3 points (ungraded)

The 3-input boolean function $G(A,B,C)$ computes $\overline{A}\cdot\overline{C}+A\cdot\overline{B}+\overline{B}\cdot\overline{C}$.

A) How many 1's are there in the output column of G's 8-row truth table?

- ○ 3
- ◉ 4
- ○ 5
- ○ 6
- ○ none of the above

✔

B) A minimal sum-of-products expression for G is:

- ○ $A\cdot\overline{B}\cdot C+\overline{A}$
- ○ $A\cdot B\cdot C+A\cdot\overline{B}\cdot\overline{C}$
- ◉ $A\cdot\overline{B}+\overline{A}\cdot\overline{C}$

Calculator

- ( ) $\overline{A} \cdot \overline{C} + \overline{B} \cdot \overline{C}$
- ( ) all of the above
- ( ) none of the above

C) There's good news and bad news: the bad news is that the stockroom only has G gates. The good news is that it has as many as you need. Using only combinational circuits built from G gates, one can implement

- ( ) only functions with 3 inputs or less
- (•) any function (G is universal)
- ( ) only functions with the same truth table as G
- ( ) only inverting functions
- ( ) only non-inverting functions

Submit

Discussion

Hide Discussion

Topic: 4. Combinational Logic / LE4.5

Add a Post

Show all posts by recent activity

- question and answer are misconducts
  the question asks for the minimum number of 2 input nand and the answer is we need at most 5 2-input nand ! i can make an expres... 2
- Minimum number of 2-input NANDs needed?
  I think the minimum number of NANDs is 9. As to a 2-input Boolean function, say f(A,B), then f(A,B) = not(A)*not(B) + AB would cost ... 2
- G(A,B,0) == Nand ?
  I can see that if I only take the terms where C=0 in the Truth table of G ——>We get NAND's truth table. How can I simplify **G = ~C.... 2
- Why just A.~B+~A.~C?
  For part B of question LE4.5.2, could someone explain to me why the answer is just A.~B+~A.~C but not A.~B+~A.~C and ~A.~C+~B... 2
- [STAFF] Minimum number of 2-input NANDs needed to implement arbitrary 2-input Boolean function
  It seems to me the minimum number of 2-input NANDs needed to implement any arbitrary 2-input Boolean function is only 3. Reason... 8

< Previous Next >

Calculator

edX

About
Affiliates
edX for Business
Open edX
Careers
News

Legal

Terms of Service & Honor Code
Privacy Policy
Accessibility Policy
Trademark Policy
Sitemap

Connect

Blog
Contact Us
Help Center
Media Kit
Donate

GET IT ON Google play
Download on the App Store

Calculator