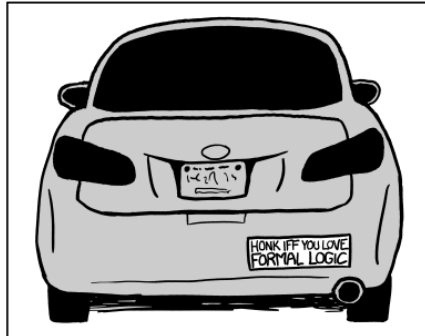


Practical 3

After completion of this tutorial you should be able to perform algebraic manipulations on logic functions, synthesize circuits from logic functions, extract logic behaviour truth tables, and implement small logic functions in C.

Praktika 3

Na afloop van die tutorial behoort u vertrouwd te wees met die algebraïese manipulاسie van logiese funksies, sintese van logiese stroombane, beskrywing van logiese gedrag vanaf waarheidstabelle en die implementering van klein logiese funksies in C.



Please read and go through the following:

- This SunLearn quiz contains all the questions related to the practical session.
- Every individual need to complete the quiz and serves as an indication of attendance of the session.
- The quiz is open for the entire practical session and will automatically close and submit after the defined deadline.
- There are multiple types of questions, some will give feedback whether your answer is correct and others the feedback might be deferred.
- These questions serve as preparation for the main assessments and the type of questions and their interface are a good indication of what to expect.

Lees asseblief en gaan deur die volgende:

- Hierdie SunLearn vasvra bevat al die vrae wat verband hou met die praktiese sessie.
- Elke individu moet die vasvra voltooi en hierdie dien as indikاسie van bywoning van die sessie.
- Die vasvra is oop vir die volledige praktika sessie en sal automaties sluit en die antwoorde indien na die gestelde slutingstyd.
- Daar is 'n paar tipes vrae, sommige van hulle sal terugvoer gee of die antwoord korrek is en ander is die terugvoer afgesit.
- Hierdie vrae dien as voorbereiding vir die hoof-assesserings en die tipe vrae en hul koppelvlak is 'n goeie indikاسie wat om te verwag.

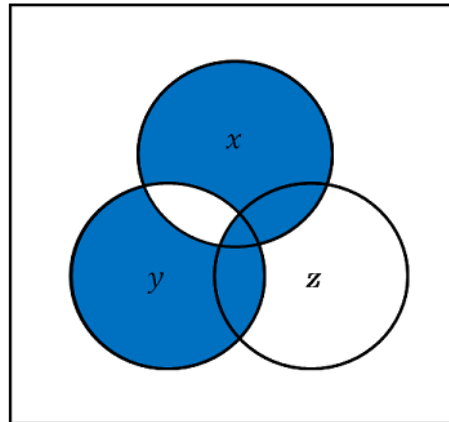
Venn Diagrams / Venn-diagramme Version 1 (latest)

Question 1

Answer saved
Marked out of
1.00

Identify the logical expression that corresponds to the following Venn diagram (blue = true):

Identifiseer die logiese uitdrukking wat met die volgende Venn-diagram ooreenstem (blou = waar):



Select one:

- ☒ a. $x \cdot \bar{y} \cdot \bar{z} + \bar{x} \cdot y \cdot z + x \cdot \bar{y} \cdot z + \bar{x} \cdot y \cdot \bar{z} + x \cdot y \cdot z$
- ☐ b. $x \cdot y \cdot \bar{z}$
- ☐ c. $x + y + \bar{z}$
- ☐ d. $\bar{x} \cdot \bar{y} \cdot z + x \cdot y \cdot \bar{z} + x \cdot y \cdot \bar{z}$
- ☐ e. $x \cdot y + \overline{x \cdot y} + \bar{z}$

Clear my choice

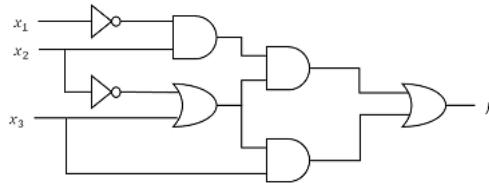
≡ Analysis / Analise Version 1 (latest)

Question 1

Answer saved
Marked out of 100

Consider the following logical network built from AND, OR and NOT gates:

Beskou die volgende logiese netwerk gebou met EN, OF en NIE hekke:



Which of the following is the simplest logical expression for the above network?

Watter een van die volgende is die eenvoudigste logiese uitdrukking for die netwerk hierbo?

Select one:

- ☐ a. $f = (\bar{x}_1 \cdot x_2) \cdot (\bar{x}_2 + x_3) + (x_3 \cdot (\bar{x}_2 + x_3))$
- ☐ b. This network cannot be expressed as a logic function
Die netwerk kan nie as 'n logiese funksie uitgedruk word nie.
- ☐ c. $f = (\bar{x}_1 \cdot x_2) \cdot (x_2 + \bar{x}_3) + (x_3 \cdot (x_2 + \bar{x}_3))$
- ☒ d. $f = x_3$
- ☐ e. $f = x_1 + x_2 \cdot \bar{x}_3$

Clear my choice

≡ Duality / Dualiteit Version 1 (latest)

Question 1

Answer saved
Marked out of 100

Find the dual of the logical function:

Bepaal die dual van die logiese funksie:

$$f = x_1 \bar{x}_2 \cdot (\bar{x}_1 + x_3) + \overline{x_3 \bar{x}_2}$$

Select one:

- ☐ a. f is a dual of itself
 f is 'n dual van homself
- ☒ b. $(x_1 + \bar{x}_2 + \bar{x}_1 x_3) \cdot \overline{x_3 + \bar{x}_2}$
- ☐ c. $\bar{x}_1 + x_2 + x_1 \bar{x}_3 \cdot \overline{x_3 + \bar{x}_2}$
- ☐ d. $\overline{x_1 \bar{x}_2} \cdot (\bar{x}_1 + x_3) + x_3 \bar{x}_2$
- ☐ e. $x_1 \bar{x}_2 \cdot (x_1 + \bar{x}_3) + \bar{x}_3 x_2$

Clear my choice

Question 1

Answer saved

Marked out of 100

For the function f represented by the following truth table:

Vir die funksie f what deur die volgende waarheidstabel vertoon word:

x	y	z	f
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	0

Find the **minimum-cost product-of-sums** expression.

(Hint: Begin with the product-of-maxterms and use algebraic manipulation.)

Bepaal die **minimum-koste produk-van-somme** uitdrukking.

(Wenk: begin met die produk-van-maksterme en gebruik algebraiese manipulerings.)

Select one:

- ☐ a. $(x + y + z)(\bar{x} + y + z)(\bar{x} + y + \bar{z})$
- ☐ b. $f = (x + y + z)(\bar{x} + y)$
- ☐ c. $(\bar{x} + \bar{y} + \bar{z})(x + \bar{y} + \bar{z})(x + \bar{y} + z)$
- ☐ d. $f = (x + \bar{z})(x + \bar{y} + z)(\bar{x} + \bar{y})$
- ☒ e. $f = \bar{y}(x + \bar{z})$

Clear my choice

≡ Sum-of-Minterms / Som-van-Minterme Version 1 (latest)

Question 1

Answer saved
Marked out of
100

Select the combination of minterms that equal the sum-of-minterms for the function:

Kies die kombinasie van minterme wat gelyk is aan die som-van-minterme vir die funksie:

$$f = \overline{x\bar{y}} + y \cdot z \cdot x$$

(Hint: Use a truth table.)

(Wenk: gebruik 'n waarheidstabel.)

Select one or more:

☒ a. $m_0 = \bar{x}\bar{y}\bar{z}$

☒ b. $m_1 = \bar{x}\bar{y}z$

☒ c. $m_2 = \bar{x}y\bar{z}$

☒ d. $m_3 = \bar{x}yz$

☐ e. $m_4 = x\bar{y}\bar{z}$

☐ f. $m_5 = x\bar{y}z$

☒ g. $m_6 = xy\bar{z}$

☒ h. $m_7 = xyz$

≡ SOP Function Version 1 (latest)

Question 1

Answer saved
Marked out of
100

Determine the SOP function that implements the truth table below and simplify it algebraically. Use the graphical method (using Bubble pushing and De Morgan's theorem) to change the function so that only NAND gate are required.

Bepaal die SOP funksie wat die onderstaande waarheidstabel implementeer en vereenvoudig dit algebraïes. Gebruik die grafiese metode (met borrelstoting en De Morgan se stelling) om die funksie te verander sodat slegs NENhekke benodig word.

x1	x2	x3	f
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

☒ a.
$$f = (x_2)(\overline{x_1} \overline{x_3})$$

☐ b.
$$f = (x_2)(\overline{x_1} \overline{x_3})$$

☐ c.
$$f = (x_1)(\overline{x_2} \overline{x_3})$$

☐ d.
$$f = (x_2)(\overline{x_1} \overline{x_3})$$

☐ e.
$$f = (x_1)(\overline{x_2} \overline{x_3})$$

Clear my choice

Q7_i Version 1 (latest)

Information

Assume that a large room has three doors and one light in the center of the room. Three latching switches (one at each door) are provided to switch the light on and off. Changing the state of any one of the switches, should change the state of the light. Design a system that takes the three latching switches as inputs and provide an output signal for the light switching circuit.

Aanvaar dat a groot kamer drie deure het en een lig in die middel van die kamer. Drie skakelaars (een by elke deur) is beskikbaar om dit lig aan en af te skakel (skakelaars bly in toestand waarin hulle gelos word). As enige van die skakelaars se toestand verander, dan behoort die lig se toestand ook te verander. Ontwerp 'n stelsel wat drie skakelaars neem as intrees en 'n uittreesein vir die ligskakelstroombaan verskaf.

Q7_1 Version 1 (latest)

Question 1

Answer saved
Marked out of 8.00

Populate the truth table of the required system. Take x_1 , x_2 , and x_3 as the input and y as the output of the system.

Voltooi die waarheidstabel van die verlangde stelsel. Neem x_1 , x_2 , en x_3 as die intree en y as die uitree van die stelsel.

x_1	x_2	x_3	y
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Cr Question 7 (c) Version 1 (latest)

Question 1

Not complete
Marked out of
100

Capture the behavior of the function in a C-function with prototype (HINT: Sum-of-product or Product-of-sum):
Implementeer die gedrag van die funksie in 'n C-funksie met die prototipe (HINT: Som-van-produkte of Produk-van-somme):

```
bool LightStatus(bool x1, bool x2, bool x3)
```

Answer: (penalty regime: 0 %)

Reset answer

```
1 bool LightStatus (bool x1, bool x2, bool x3)
2 {
3     bool term1 = (!x1) && (!x2) && (x3);
4     bool term2 = (!x1) && (x2) && (!x3);
5     bool term3 = (x1) && (!x2) && (!x3);
6     bool term4 = (x1) && (x2) && (x3);
7     return term1 || term2 || term3 || term4;
8 }
```

Check

Q7_4 Version 1 (latest)

Information

Download the template Digital design file (question.dig) from SunLearn. Use logic gates (Components>Logic) to implement the function using the given inputs and outputs. You can change the number of inputs a logic gate has by right-clicking on it. When you are done, save your file and exit Digital. Open the Practical 3 Digital Quiz and follow the instructions.

Kry die Digital templaar ontwerp leer (question.dig) vanaf SunLearn. Gebruik die logiese hekke (Components>Logic) om die funksie te implementeer met die gegewe intrees en uitrees. Jy kan die aantal intrees van 'n logiese hekk verander deur regs te kliek daarop. Waaneer jy klaar is, stoor jou leer en maak Digital toe. Maak die "Practical 3 Digital Quiz" oop en volg die instruksies.

Digital Submission Version 1 (latest)

Question 1

Not yet
answered
Marked out of
100

Download the template Digital design file (question.dig) from SUNLearn. Use logic gates (Components>Logic) to implement the function using the given inputs and outputs. You can change the number of inputs a logic gate has by right-clicking on it. When you are done, save your file and exit Digital. Right click on the file containing your answer, click on "Open With" and then select Notepad. Press CTRL+A to highlight the entire file. Press CTRL+C to copy the file text and then CTRL+V to paste it into the text box.

This text describes your circuit. We will use this text to run your circuit and test it according to the expected behaviour. Ensure that the entire description of your circuit is pasted successfully otherwise your circuit will not be able to run during the tests.

Kry die Digital templaar ontwerp leer (question.dig) vanaf SunLearn. Gebruik die logiese hekke (Components>Logic) om die funksie te implementeer met die gegewe intrees en uitrees. Jy kan die aantal intrees van 'n logiese hekk verander deur regs te kliek daarop. Waaneer jy klaar is, stoor jou leer en maak Digital toe. Regs-kliek op die leer wat ju antwoord bevat, en selekteer "Open With" en selekteer dan Notepad. Druk CTRL+A om die hele inhoud van die leer te selekteer. Druk dan CTRL+C om die seleksie te kopieer en dan CTRL+V om dit in die teks-invoer te plak.

Hierdie teks beskryf jou stroombaan. Ons gaan hierdie beskrywing van jou baan gebruik en dit toets teenoor die verlangde gedrag. Maak seker dat die volledige beskrywing van jou stroombaan suksesvol in die teksveld is, anders gaan ons nie jou stroombaan kan simuleer nie.