

Exam Electronica
7 Feb., 2011
Dr. G. Palasantzas

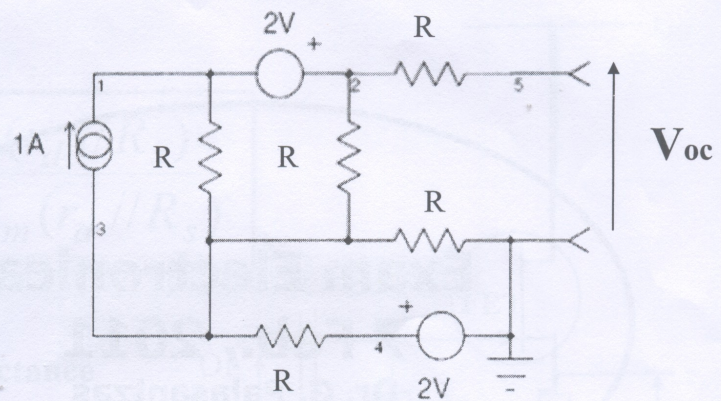
Opgave 1

(2 points)

FET versierker (1,5 points):

Bewijs:

Gegeven is de schakeling: →



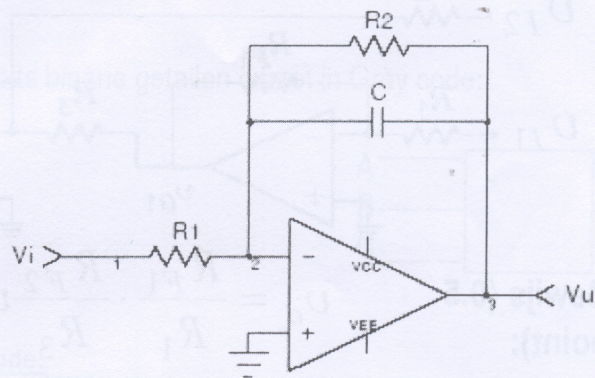
Geef het vervangingschema van Thévenin en bereken V_{oc} en R_{oc} .

Tip: Let goed op het teken van de spanningsbronnen!

Opgave 2

Ideal opamp

(a) (1.5 points)



a) Toon aan dat de DC-overdracht wordt gegeven door:

$$V_o = -\frac{1}{R_1 C} \int V_i dt \quad \text{Integrator}$$

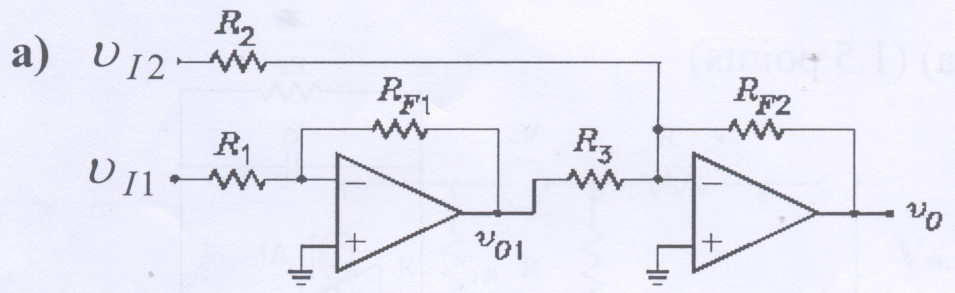
Verwaarloos hierbij R_2 (nodig om de DC-uitgangsspanning te begrenzen).

b) Toon aan dat de AC-overdracht wordt gegeven door:

$$\frac{V_o}{V_i} = -\frac{R_2}{R_1} \frac{1}{1 + j\omega R_2 C}$$

Opgave 3

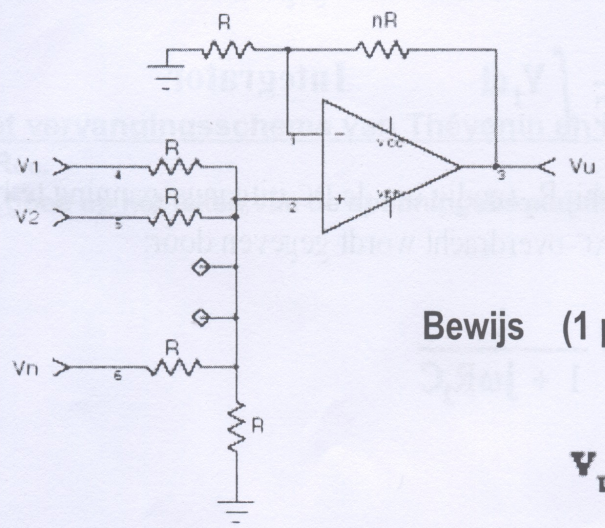
Ideal opamps



Bewijs (0.5 point):

$$v_o = \frac{R_{F1}}{R_1} \cdot \frac{R_{F2}}{R_3} v_{I1} - \frac{R_{F2}}{R_2} v_{I2}$$

b)



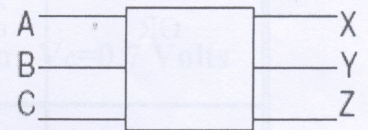
Bewijs (1 point):

$$v_o = \sum v_i$$

Opgave 4

(2 points)

Ontwerp een circuit dat 3-bits binarie getallen omzet in Gray code:

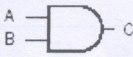




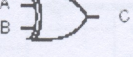



	<u>Binair</u>		<u>Gray code:</u>
0	0000	0	0000
1	0001	1	0001
2	0010	2	0011
3	0011	3	0010
4	0100	4	0110
5	0101	5	0111
6	0110	6	0101
7	0111	7	0100
8	1000	8	1100
9	1001	9	1101
10	1010	10	1111
11	1011	11	1110
12	1100	12	1010
13	1101	13	1011
14	1110	14	1001
15	1111	15	1000

Making the
truth table

A	B	C	X	Y	Z
0	0	0	0	0	0
0	0	1	0	0	1
0	1	0	0	1	1
0	1	1	0	1	0
1	0	0	1	1	0
1	0	1	1	1	1
1	1	0	1	0	1
1	1	1	1	0	0

Tabel 1 Logische poorten.

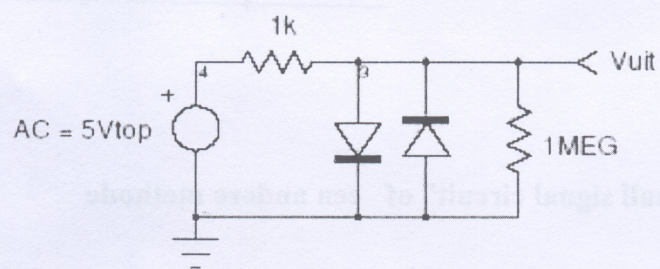
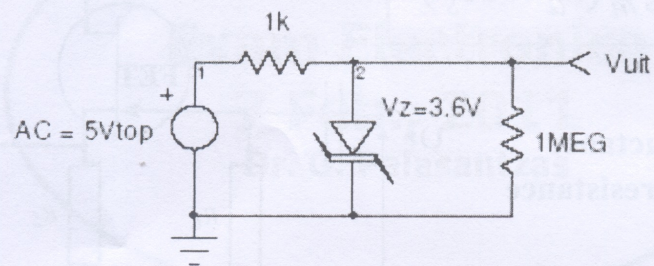
Functie	Symbol	Boolean	Waarheidstabel															
AND		$C = A \cdot B$	<table border="1"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>1</td></tr> </tbody> </table>	A	B	C	0	0	0	0	1	0	1	0	0	1	1	1
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OR		$C = A + B$	<table border="1"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td></tr> </tbody> </table>	A	B	C	0	0	0	0	1	1	1	0	1	1	1	1
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NOT		$C = \overline{A}$	<table border="1"> <thead> <tr> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr><td>0</td><td>1</td></tr> <tr><td>1</td><td>0</td></tr> </tbody> </table>	A	B	0	1	1	0									
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NAND		$C = \overline{A \cdot B}$	<table border="1"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>0</td></tr> </tbody> </table>	A	B	C	0	0	1	0	1	1	1	0	1	1	1	0
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0	1	0																
1	0	0																
1	1	1																

Opgave 5

(1 point)

Schets de vorm van V_{uit} van elke circuit

Forward geleiding spanning van dioden: $V_c=0.7$ Volts



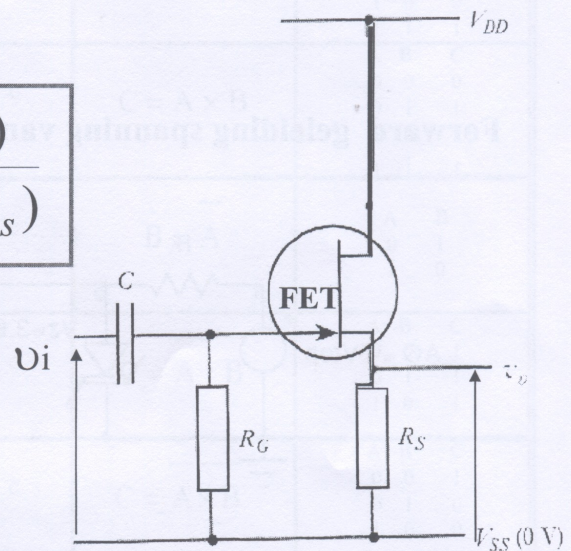
Opgave 6

FET versterker (1.5 points):

Bewijs:

$$\frac{v_o}{v_i} = \frac{g_m (r_d \parallel R_s)}{1 + g_m (r_d \parallel R_s)}$$

g_m = transconductance
 r_d : Differential resistance



Gebruik de "small signal circuit" of een andere methode