Electirc Circuit ㄉㄉ學

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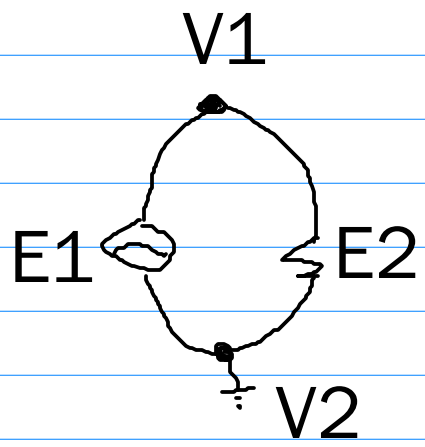
blahblahblah:

- cloud computing
- multicore (parallel programming)
- embeded software
- cosummer application mobel apps

in our course:

- electric circuits
- 電子元件
- basic eletric cirtuit
- 60% are concepts



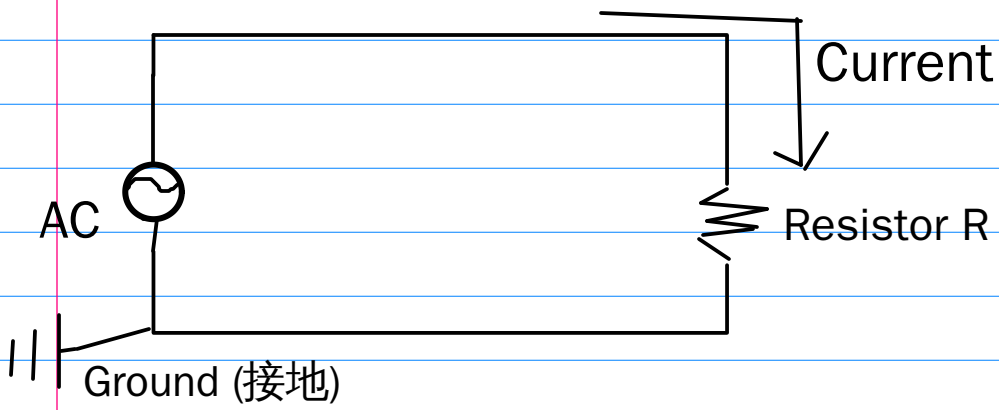

Grading:

- 3-4 homeworks
- midterm
- final

Textbook: Microelectronic Circuits 6/e

electric circuits

- components / devices  # 元件
- graph
  - vetrices (distinct electirc potential) # compare to ground V=0
  - edges (components)
- to represents the connections between electric components
- must be a components (or more) between vertices
- Edge 必對稱於 component
- votage
  - the difference between two virtices



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basic electrical circuit theory

basic concept:
- circuit
- votage / current / power
- signal
  - AC/DC
  - RMS

Definition of electric circuits:
- a graph, connections of vertices and edges, whereby every edge contains exact one electric component (Active | Passive*).
  And every vertex has a specific electric potent, where one of them is defined as 0 volt , i.e. ground

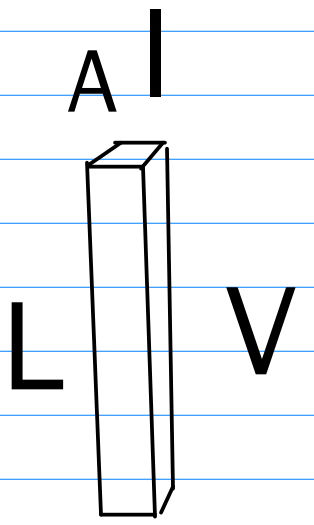
* active (gereating power), passive (consumming power)

measurment:
- electirc potential # for vertex
- current # for edge
- electric power
- V.I.P. !

$\epsilon = 1/2\ mv^2$
$\rho = mv$

能量守恆 Hamiltonian
動量守恆 Newtonian

Ohm's Law:
- V = I R
- R's definitoin => V / I




考慮長度為 L
截面積為 A
兩端電壓差為 V
通過電流 I
之導體

$R = \rho L / A = V / I$

$E = V/L = \rho I/A$ # 電場, electirc feild stream
$J = I/A$ # current density
$E = \rho J$

:036

Cbtjd!fmfdusjd!djsdvjut

.!cbtjd!djsdvjut!dpodfqu

.!tjhobm

.!efwjdft

.!qbttjwf!;!SIM

.!LWM!0!LDM!Ljsdiipgg(t!Wpmubhf!'!Dvssfou!Mbx

.!uifpsfujdbm!gpsnvmbujpo

.!qsphnbujd!tpmvujpo

.!Frvjwbmfou!Dvsdvjut!)　等效線路*

.!Uifwfojo!Frvjw/!)wpmubhf!cbtfe*

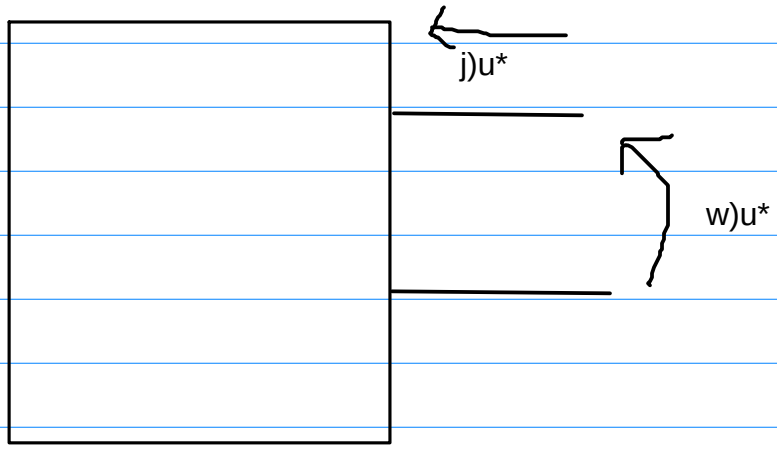
.!Opsupo(t!Frvjw/!)dvssfou!cbtfe*!

\evbmjuz^

.!joefqfoefou!dpodfqut

hfofsbmj{fe!dpodfqut!pg!sftjtubodf

uxp!qpsu!djsdvjut




[!>!W!0!J

一般化的電路：

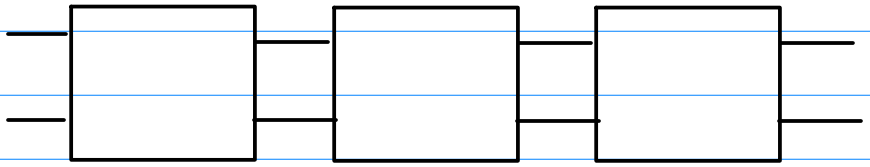
joqvu!jnqfebodf!>?!usbotgfs!gvodujpo!>?!pvuqvu!jnqfefbodf!!!!!$!　　線性代數（？）

MUJ!tztufn-!Mjofbs!ujnf.jowbsjbou!tztufn

>?!pctfswbujpo!xjoepx!　要先定好

!djsdvju!dbtdbef!)　串聯*

up!gjoe!uif!cftu!nbudijoh!)dpvqmjoh-!　藕合*



ujnf!epnbjo!bobmztjt

tjhobm!bt!xbwfgpsn!)　波形*

Gsfrvfodz!epnbjo!bobmztjt

tjhobm!bt!b!tqfdusb!)　譜*

tztufn!gsfrfodz!sftqpotf

>?!Mbqmbdf!'!Gpvsjfs!usbotgpsnt

wpmubhf!tpvsdf!>?!tjhobm!tpvsdf

Pin(t!Mbx

邵：這個大家都知道，一點都不好玩RR

j)u*!>!w)u*!0!S

opubujpo;

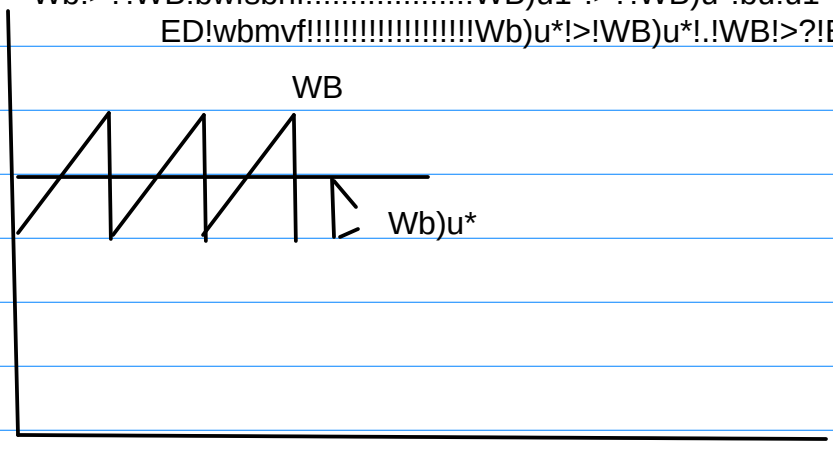
xifo!w-!j!jo!mpxfs!dbtf!>?!ujnf!wbszjoh

BD!wbmvf!)Y*

WB!>?!sfgfsfodf!up!hspvoe!!!!!!!!!Wt)u*!>!WB)u*

Wb!>?!WB!bwfsbhf!!!!!!!!!!!!!!!!!!WB)u1*!>?!WB)u*!bu!u1

ED!wbmvf!!!!!!!!!!!!!!!!!!Wb)u*!>!WB)u*!.!WB!>?!BD!wbmvf!)P*



Hsbqi!jo!Fmfdusjd!Djsdvjut

Fwfsz!wfsufy!ibt!b!ejtujodu!wpmubhf

Fwfsz!fehf!!!ibt!b!ejtujodu!dvssfou

jS)u*!>?!Fehf-!dpnqpofou!!!!bduvbm!wbmvf!>!dpnqbsf!up!{fsp!dvssfou

JS!!!!>?!Bwfsbhf!pg!jS!ED!wbmvf!dpotubou

js)u*!>?!BD!wbmvf!!>!jS)u*!.!JS

SNT!!!!!!!!!!!!!!!$!Sjdibse!Nbuuifx!Tubmmnbo!)Y*

Sppufe!Nfbo!Trvbsfe

$$V_a = \sqrt{\frac{1}{T}\int_{t_0}^{t_0+T} v_\tau^2(\tau)d\tau} \quad <=> \sqrt{\frac{1}{3}(a^2+b^2+c^2)}$$

Q!>!JW

Fmfdusjd!qpxfs!!>!dvssfou!+!Wpmubhf

$$P_\tau(t) = \frac{1}{T}\int_{t_0}^{t_0+T} i(\tau)v(\tau)d\tau$$

$$Apply\ Ohm's\ Law : i_R(t) = \frac{V_A(t)}{R}$$

$$P_\tau(t) = \frac{1}{T}\int_{t_0}^{t_0+T} \frac{v_A^2(t)}{R}d\tau$$

$$\propto \frac{1}{T}\int_{t_0}^{t_0+T} v_A^2(t)d\tau$$

$$\propto (v_A^{rms})^2$$

$$P_\tau(t) \ = \ \frac{(v_A^{rms})^2}{R}$$