Why are we here?

-Learn circuit analysis

-Learn to be critical thinkers

-Learn to ask "why?", "how?", ...

-Learn to answer your own questions by exploiting all of the resources at your disposal: Where are the clues? Where is the knowledge?

(hint: books, colleagues, experiments, etc.)

-Begin the transition from highly structured middle school to the unconstrained real world

No, really, why are we here?

-How to approach a problem

-How solution methods are transferable to other problems (duality)

-How to manage large quantities of information (nodal analysis, mesh analysis, etc.)

-Electrical engineering fundamentals (things you will be expected to know like the back of your hand in later courses)

look back at this page about midway through the course, it will make more sense then

The Numbers

12:30

Thank goodness it is not 8:30

14

minimum number of years of education you have had

$500

the approximate amount of money you are spending on this course

$22

hourly rate per lecture, the government may be supplementing this by as much as $40/hr

500

the approximate number of pages you will cover in the textbook

15

the approximate number of pages you will see on all exams

What do engineers do?

Problem solvers

Sleuths

Designers

Creators

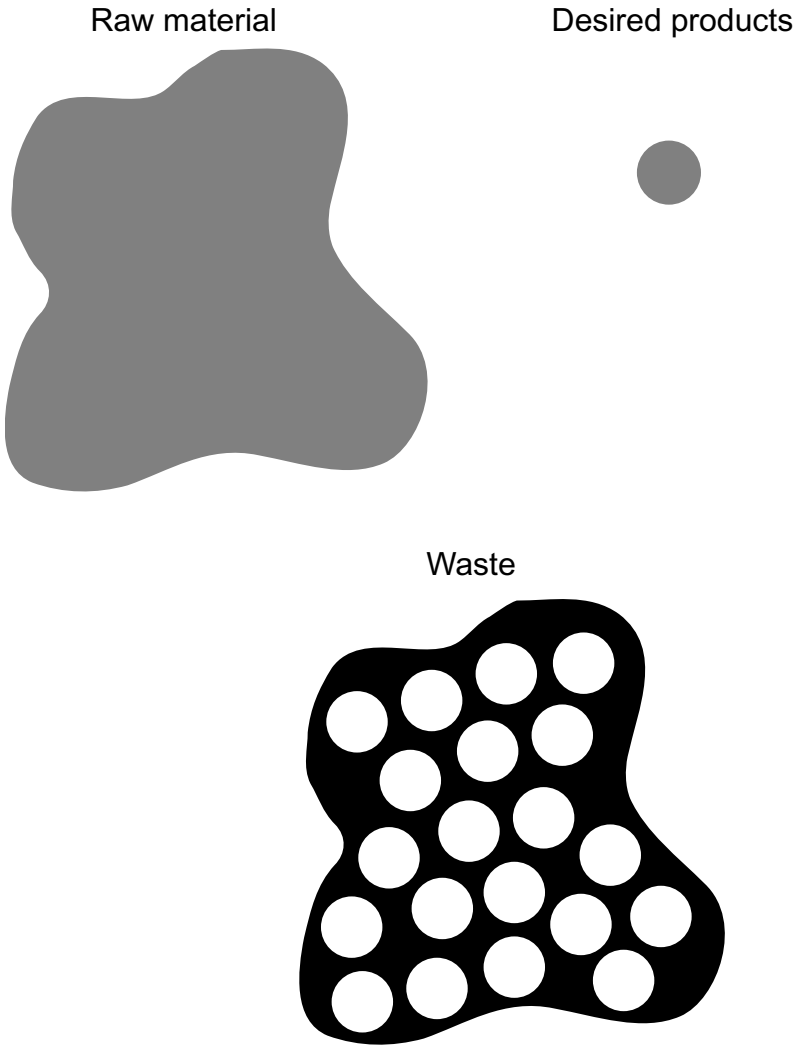
Planners

Innovators

You are the individuals who will craft tomorrow

E.g., how do you separate X from Y?

Cost of the control- discard some of the desired item and/or keep some of the undesired material



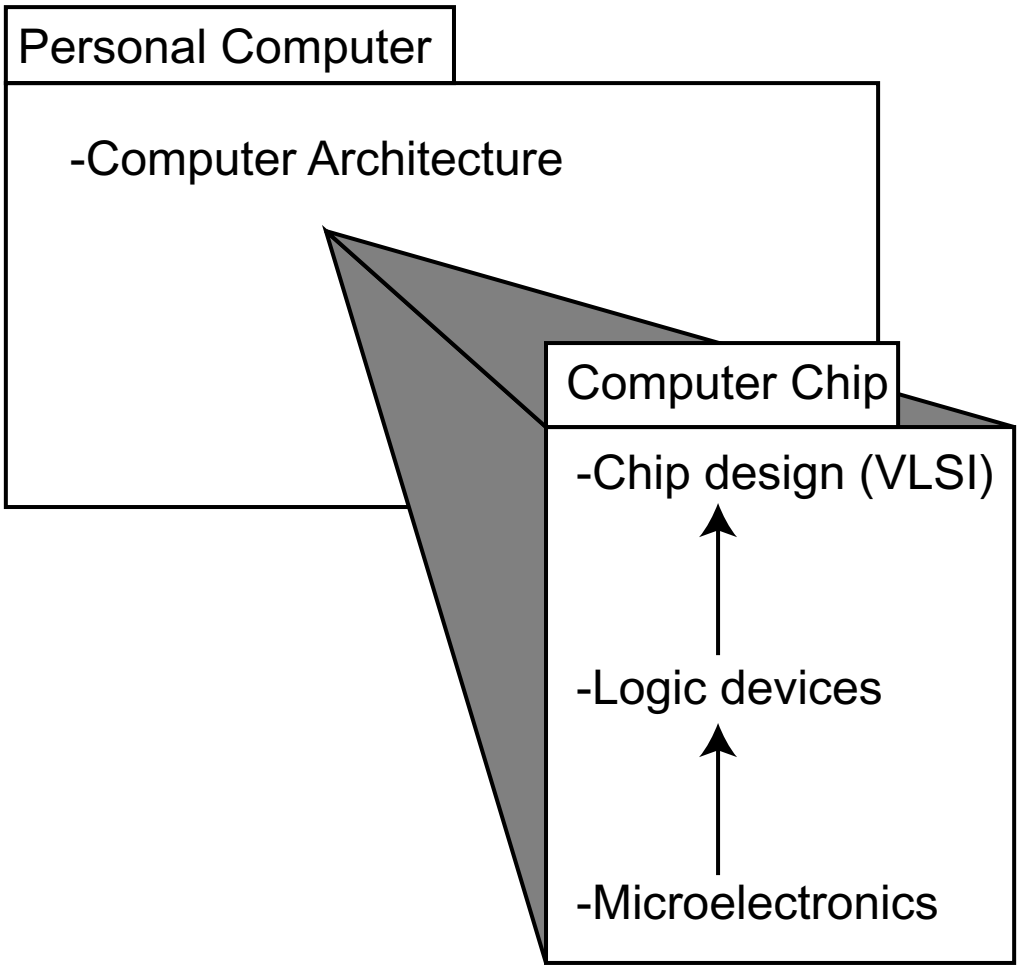
What do EE's do?

- Computers
  - From the microscopic to macroscopic
- Power systems
- Communications
  - Cell phones/pagers, TV/radio, etc.
- Sensing
  - When does something change?
  - From a simple light switch to image processing
- Controls
  - How do you respond automatically?
- Interdisciplinary work
  - e.g., biomedical engineering, transportation engineering

and many other areas...

FYI: see the faculty and research pages at: eewww.eng.ohio-state.edu for more examples

Quick example showing how four areas of EE relate in a PC



Why am I taking circuit analysis?

-Cornerstone for the various specialization's

Much as you use algebra effortlessly, without thinking about it, you will come to use the material of ee205 in later courses.

Remember in Calculus when you said, "don't worry, I'll never have to use this stuff"? Well, you were wrong... worse yet, you will have to use that long forgotten trigonometry in this course too.

But then again, think about how you use calculus today. You know the basics by heart and you know how to look up the details when you need them.

Critical course issues

Sign up for the mailing list

The course will move fast, **DO NOT** fall behind.

Use all of your resources- lecture, textbook, office hours, TA, reference text, etc..

Homework and exams are goals to inspire you to study and review the material, thereby helping you learn it. Do not cheat yourself in this study, it will catch up with you... if not now, then in a later course or your career (see below).

Exams will look nothing like homework and lectures. On the exams you will have to integrate ideas from the course.

In preparation for exams, you will have to internalize basic concepts and techniques, as well as know when and where to turn for further information, e.g.,

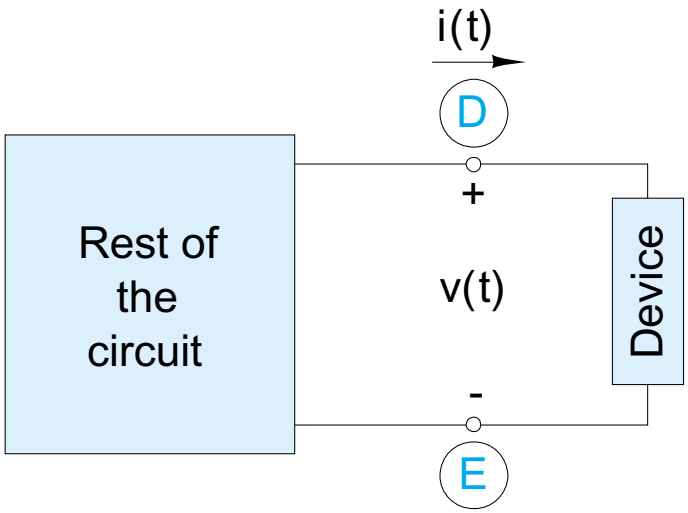
$$\frac{10}{2} \quad \text{versus} \quad \frac{947204}{55414}$$

Circuit Variables

Charge: q(t) [C]

Energy: w(t) [J]

Note, lower case variables denote time varying parameters, upper case variables denote constant parameters



Current: i(t) [A] -- the flow of electrical charge through a point

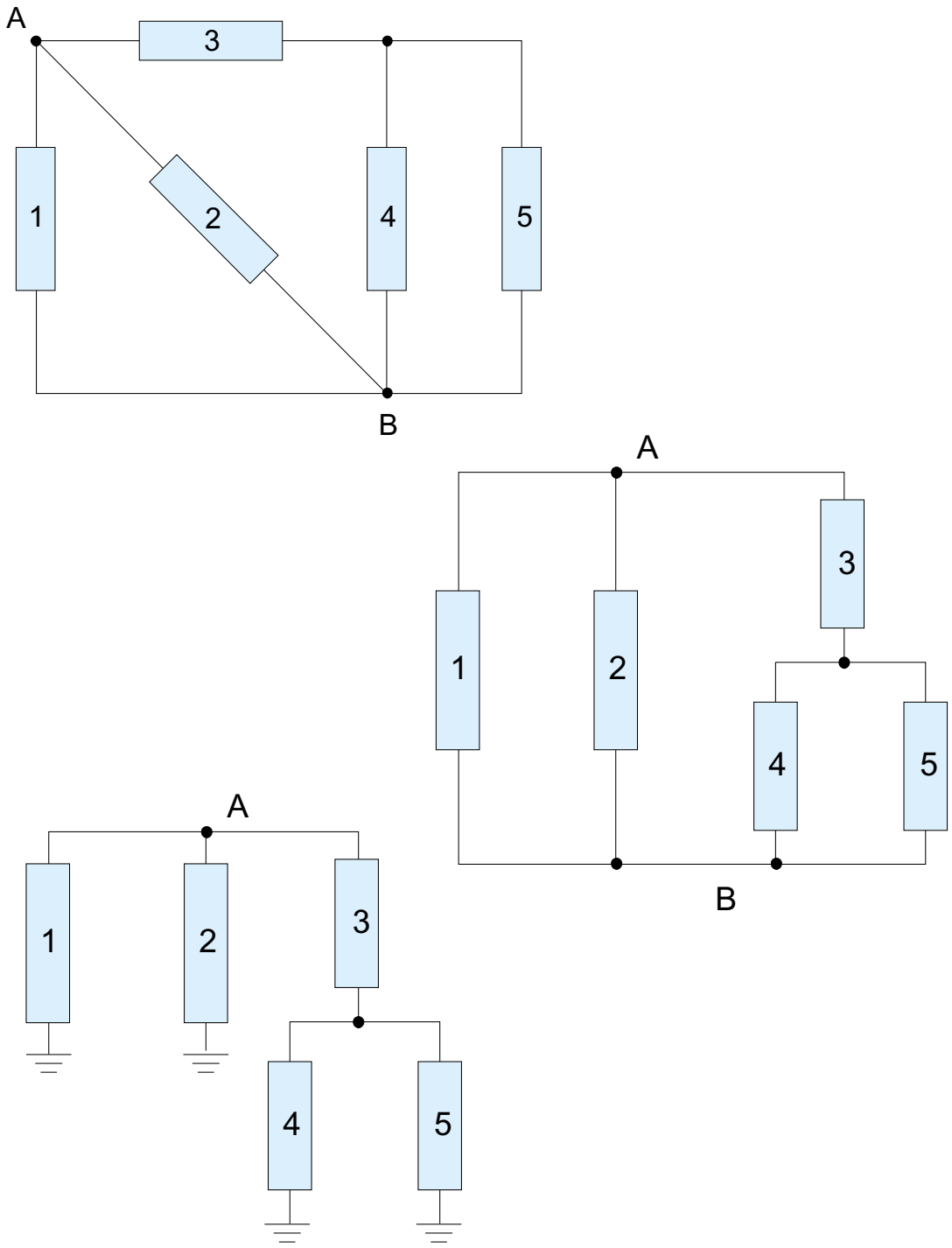
$$i=dq/dt$$

FYI: electrons are the most common charged particle of interest and they have a negative charge. So, a positive current from D to E would indicate a flow of electrons from E to D. Got your mind in a spin? Don't worry, in this course we will not spend much time talking about charged particles.

Voltage: v(t) [V] -- energy to move a unit charge between points

$$v=dw/dq$$

Important: convention denotes current flowing from plus symbol to minus symbol with respect to voltage (and vice versa)... but the current and/or voltage can have a negative value.



Important: Much as the distance between two points in space is independent of how you travel between them, the voltage between A and B is independent of the path from A to B. Furthermore, there are many ways to denote the same circuit.

Electric potential (potential kinetic energy) and current (flow of water) performance art

Power: p(t) [W]

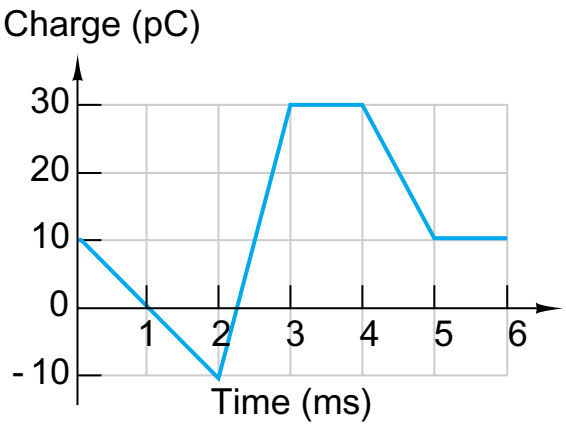
$$p = dw/dt = v \cdot i$$

p>0, element absorbs power

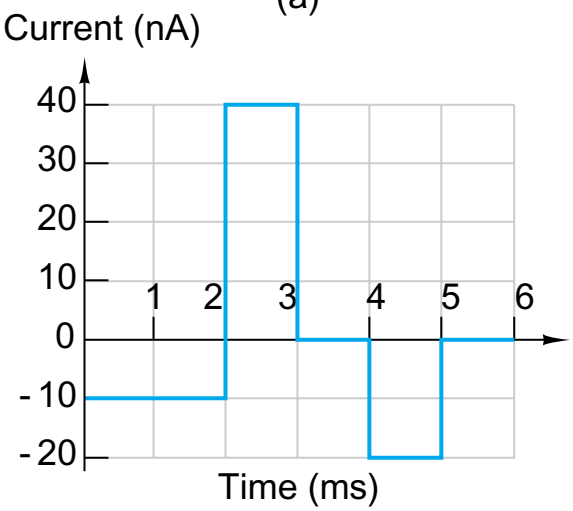
p<0, element supplies power

Note: you can form all sorts of fun relationships from the equations, e.g.,

$$i=dq/dt \quad => \quad q=i \cdot t$$



(a)



(b)

A few closing words:

At any given instant, current must be the same at ALL locations along a path between two nodes.

(assuming there is not an intermediate node with a divergent path between the two nodes, see KCL)

At any given instant, voltage must be the same along ALL paths between two nodes