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Tuesday

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reminder individual assignment
due Thursday

USC lecture

bring your documents
design on Thursday -
each member

more examples of metamorphic
properties of team
own copy

go to midterm grade distribution

if we input student grades in a
different order - permutation
should get same distribution

if we add 10 or subtract 10 from
every grade, should get
same distribution shifted by 10

if we pick a random student &
remove his/her grade from set,
we should get same distribution
minus that grade

if we add an imaginary student &
assign randomly chosen grade 0-100
should get same distribution
plus that student

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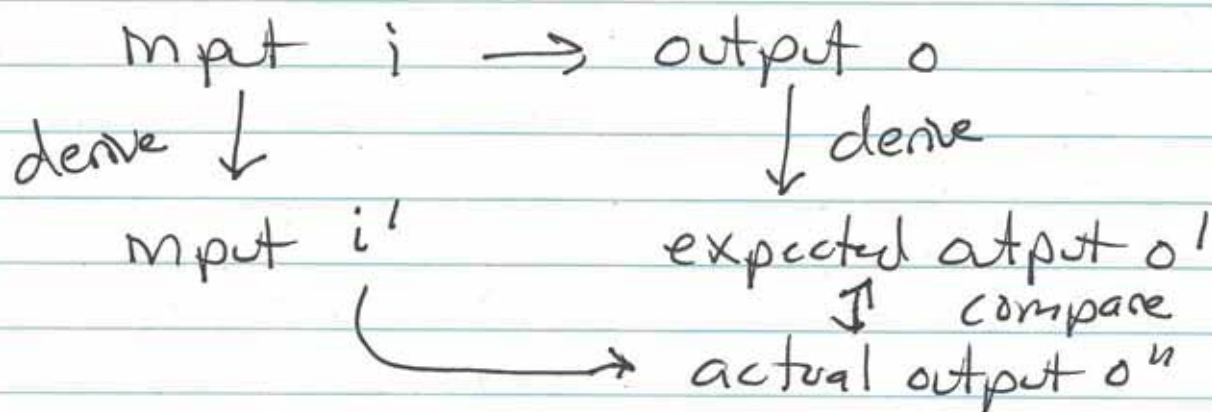
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if we negate every student's grade

$$x \Rightarrow -x$$

we should get same distribution
flipped to negative

in general



important to understand that
 o' is predicted from o
but not necessarily identical

metamorphic testing may be
easiest to understand
when dealing with numbers
or sets of numbers

but the numbers do not need to
come from numerical
computations

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consider a search

$x \text{ AND } y \Rightarrow y \text{ AND } x$

Should get same number
of results in same order
→ and also same specific results
(probably not numerical)

consider a search over
Shakespeare's plays

Romco AND Juliet \Rightarrow Juliet AND Romco

Romco AND "foo" - none

Romco OR "foo" - same as Romco

What is the difference between
metamorphic testing &
~~the~~ program invariants?

invariant true
run $y = f(x)$
invariant still true

relationship
before & after
one execution
with one set of
input/outputs

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metamorphic property is a relationship
between Pairs of executions

program invariants are also very
useful for detecting bugs
but not same thing

- be careful to NOT tell us
about program invariants
when asked for metamorphic
properties

continue rest of USC lecture if time
seeking Project Students