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metamorphiz testing

extra credit on pair assignment

show portion of USC lecture

more examples of metamorphiz properties

midterm grade distribution

input grades in different order
(permutation), same distribution

add or subtract 10 to/from every
grade, same distribution shifted by 10

pick random student & remove grade,
same distribution minus that grade

add imaginary student & random
grade, same distribution plus

negate every grade $x \Rightarrow -x$

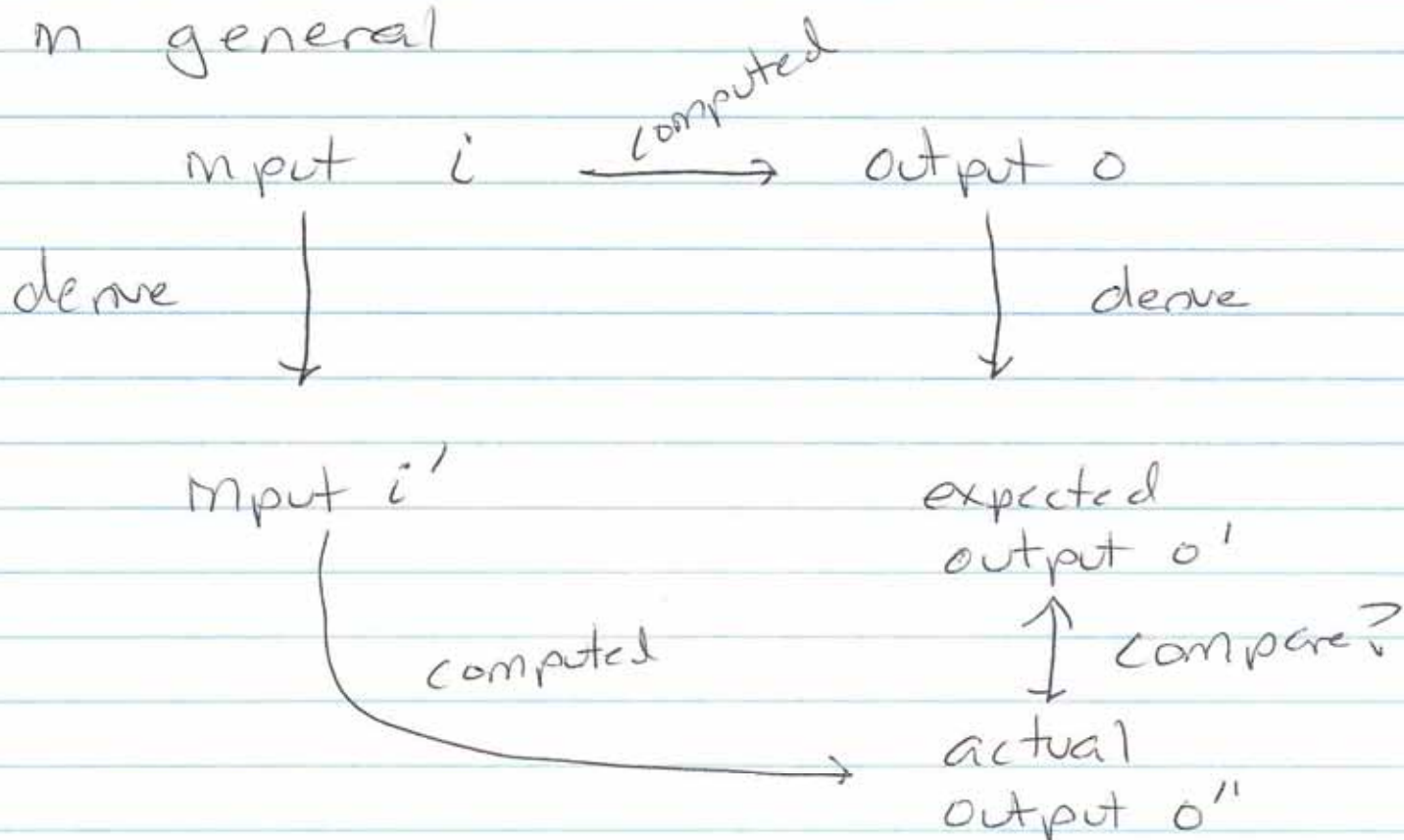
maybe get same distribution
flipped to negative

maybe get error if program
knows grades must be non-neg

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in general



o' is predicted from o , but not necessarily identical

metamorphic testing easiest to understand with numbers or sets of numbers, but applies to any data type

consider a search

$x \text{ AND } y \Rightarrow y \text{ AND } x$
 should get same results in
 same order (maybe)

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search over Shakespeare's plays

Romeo AND Juliet \Rightarrow Juliet AND Romeo
again same result (assuming
AND semantics)

Romeo AND "foo" \Rightarrow none
Romeo OR "foo" \Rightarrow same as
Romeo

metamorphic testing is related to
checking program invariants

prebreak true

run $y = f(x)$

prebreak still true

relationship
before + after
with ONE
input/output pair

metamorphic property is relationship
between pairs of executions -
TWO input/output pairs

if time, continue rest of USC lecture?
or refactoring lecture? video
- Seeking project students