

CMPT 473
Software Quality Assurance

Data Flow Criteria

Nick Sumner

Focus on Data

- Programs manipulate data
 - Focus on testing the ways that data moves/*flows*

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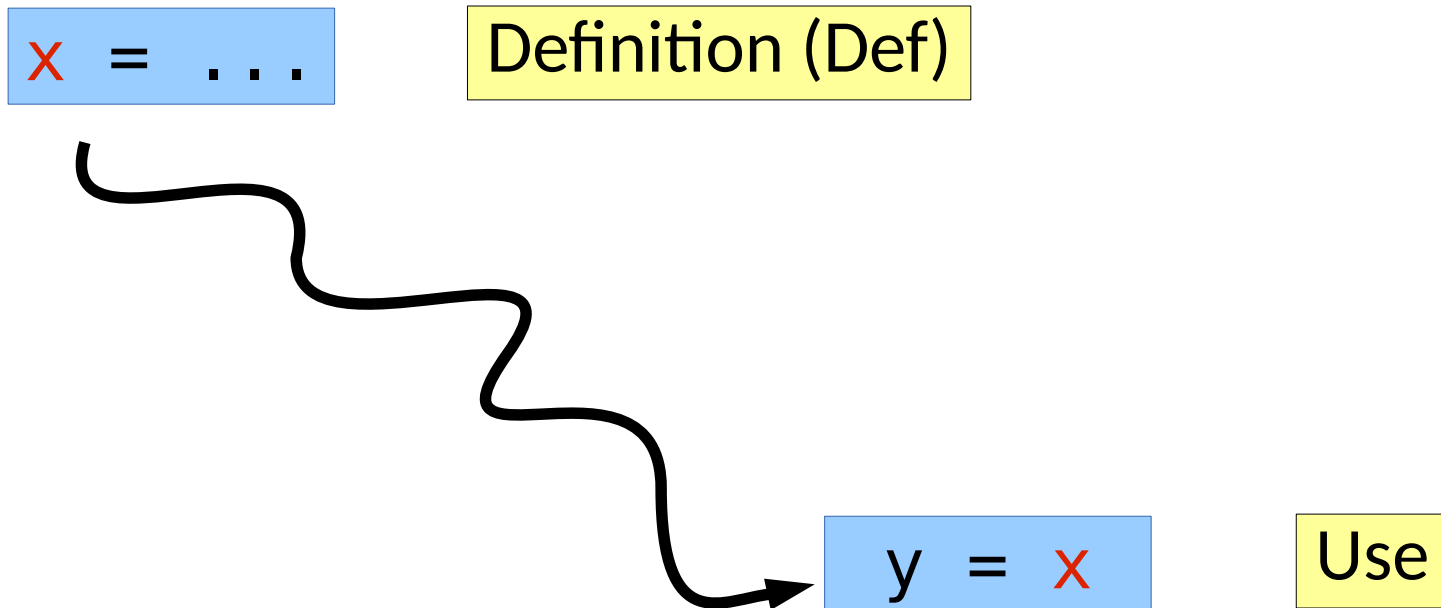
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x = ...

Definition (Def)

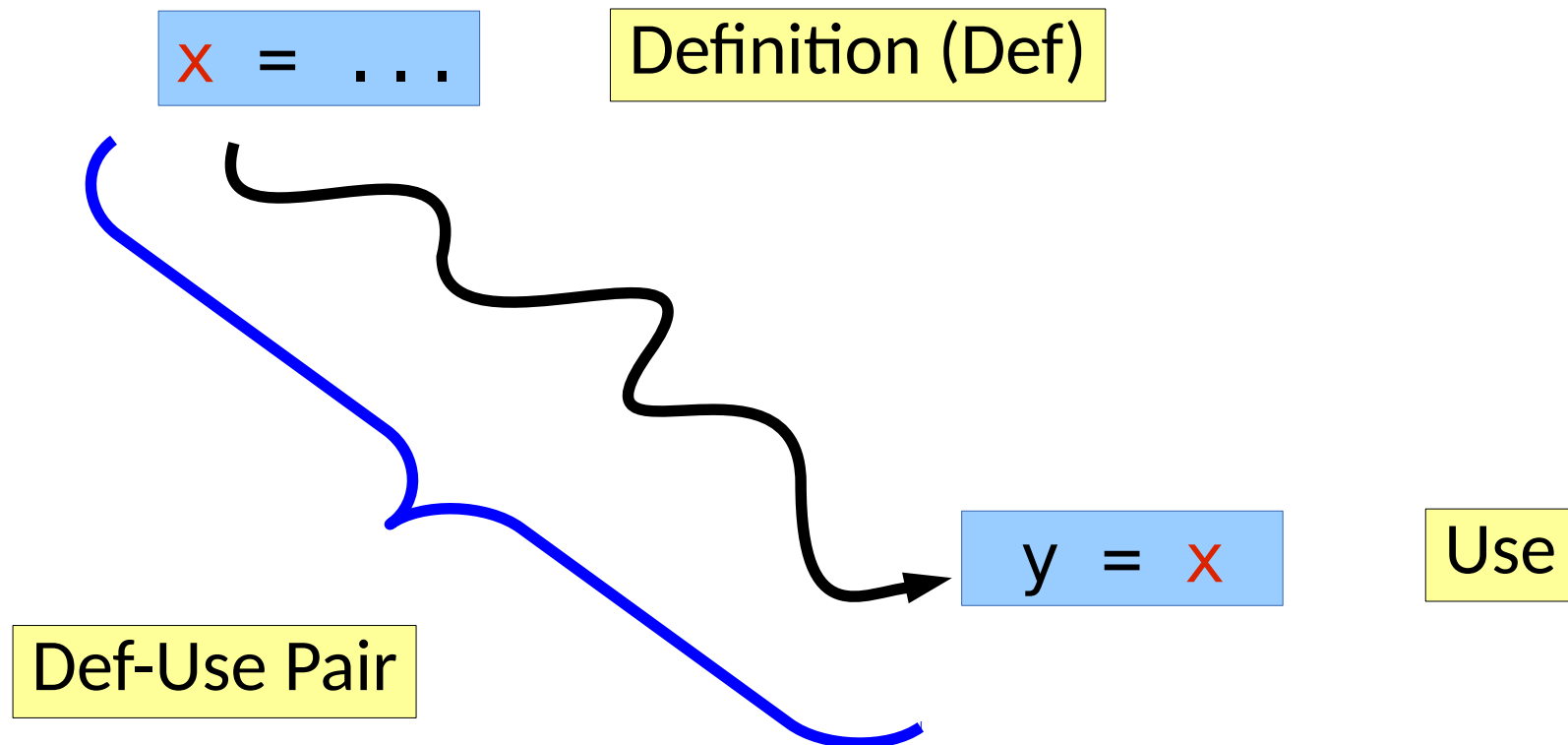
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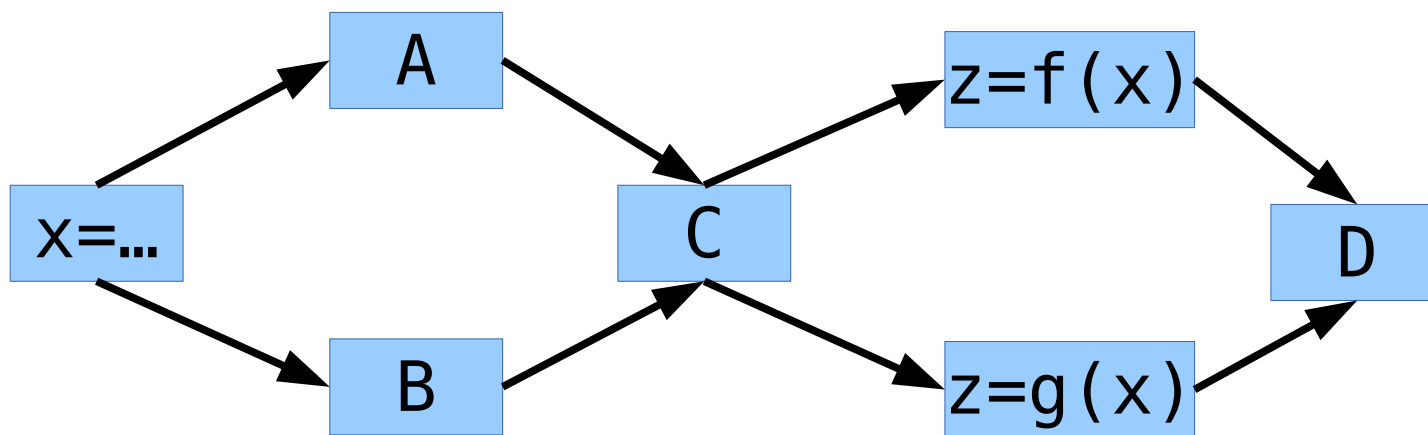


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- New goal?
 - Try to test all of the ways that a Def may flow to its varied uses

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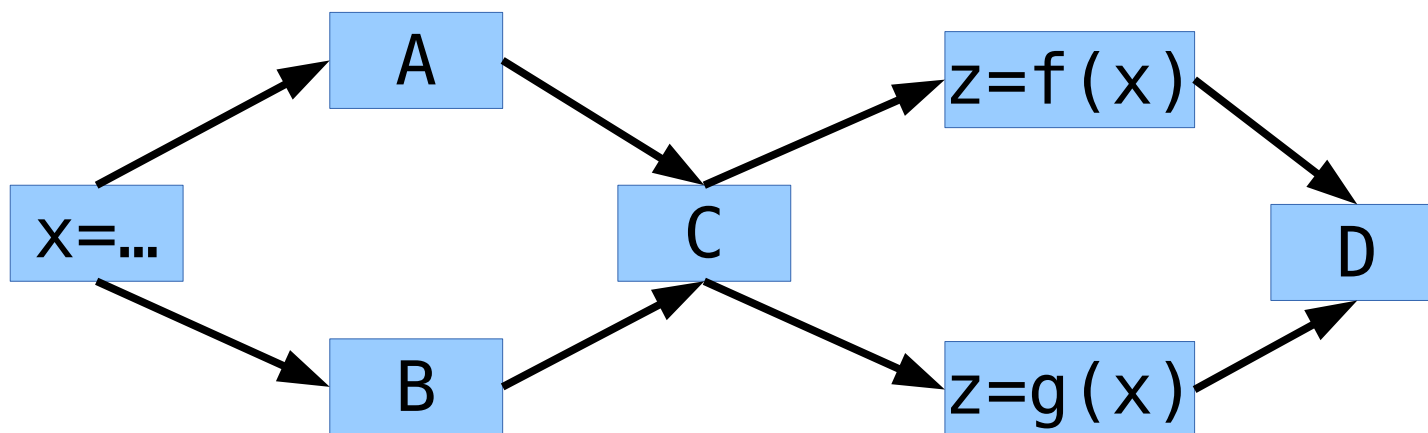
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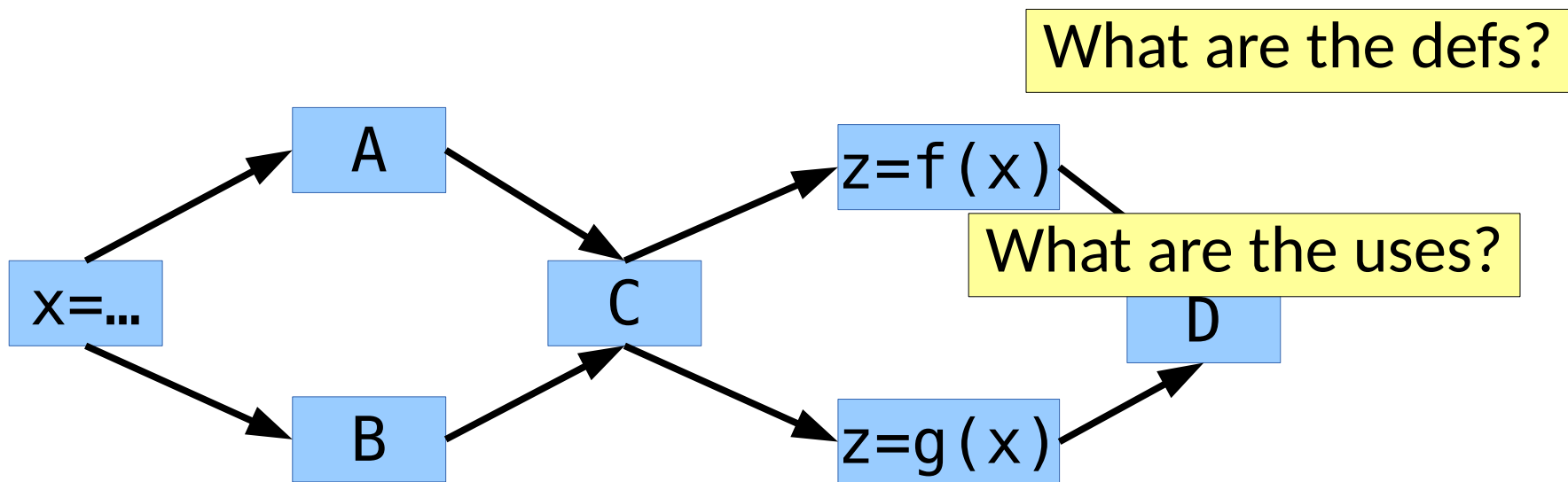
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What are the defs?



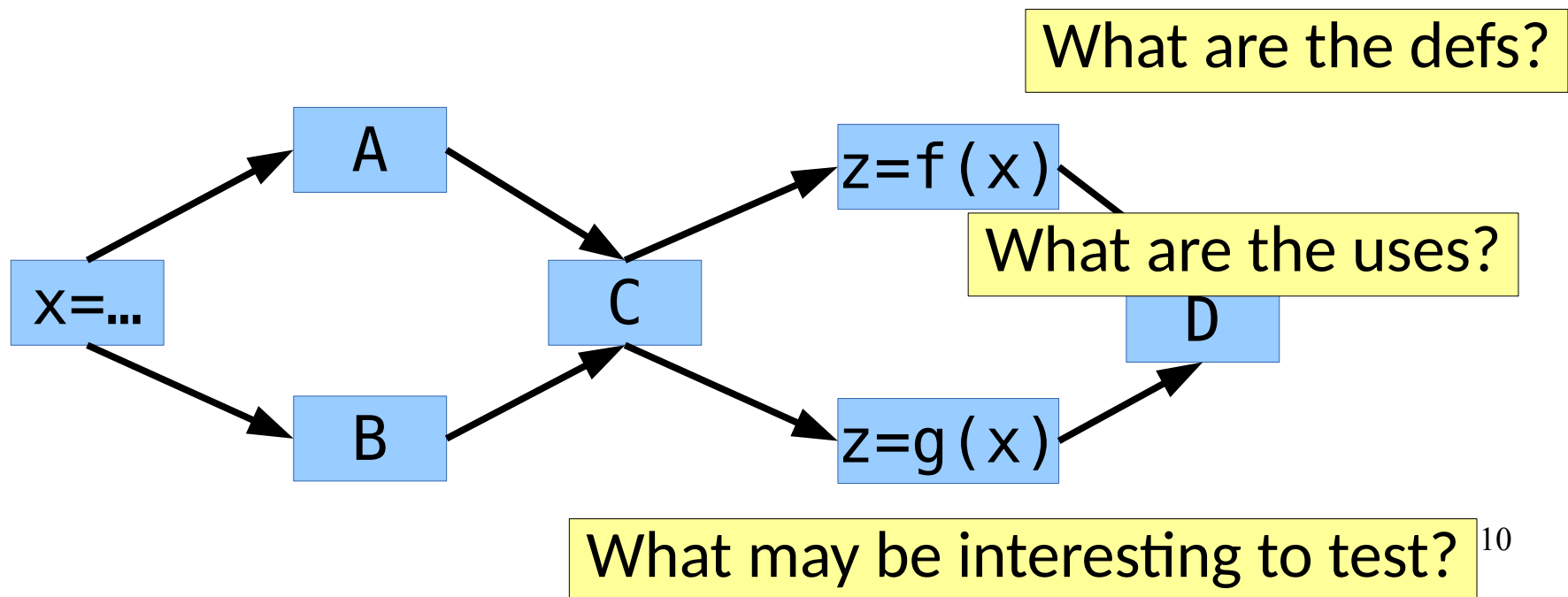
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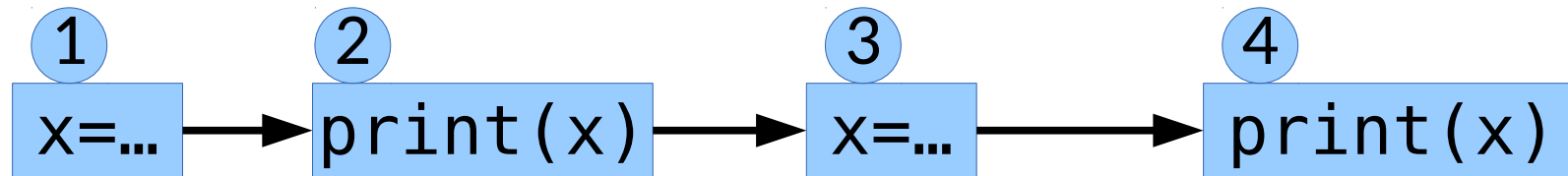


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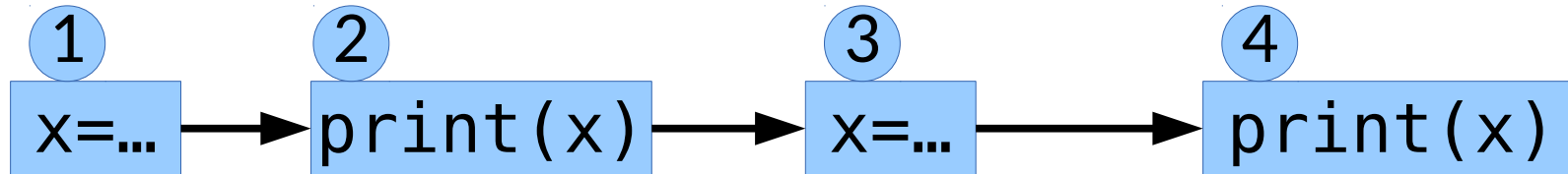
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Reachability

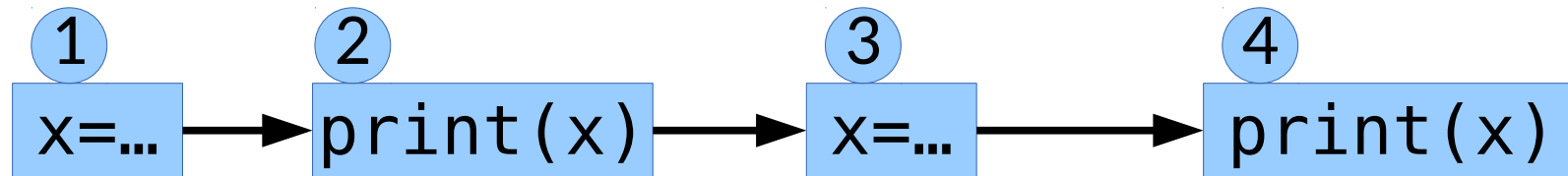


Reachability



What are the def-use pairs?

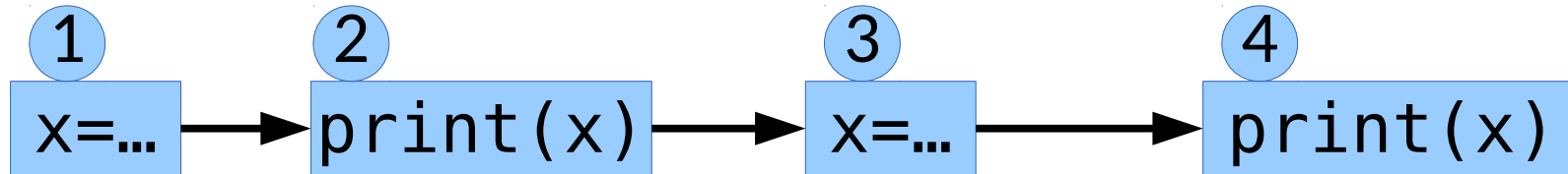
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What are the def-use pairs?

What is interesting to test?

Reachability

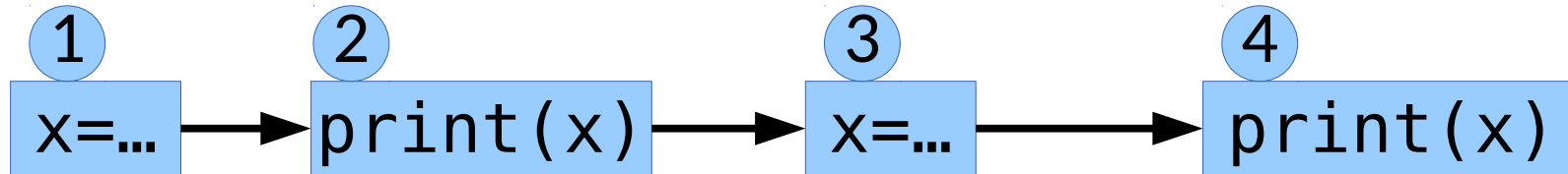


What are the use pairs?

What is interesting to test?

- The def at ① is *killed* by the def at ③,

Reachability



What are the use pairs?

What is interesting to test?

- The def at ① is killed by the def at ③, so it does not *reach* ④

Possible Criteria

- All Defs Coverage
 - Every Def is covered by at least one test of a use

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How do these compare to edge coverage?

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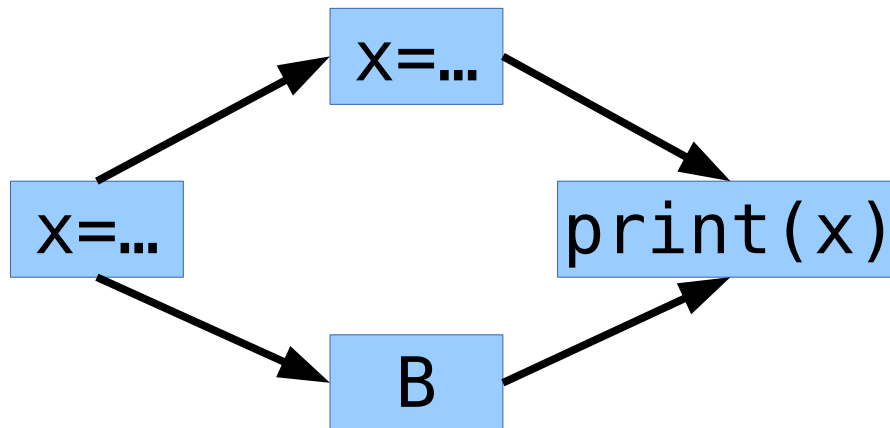
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How do these compare to edge coverage?

How do these compare to prime paths?

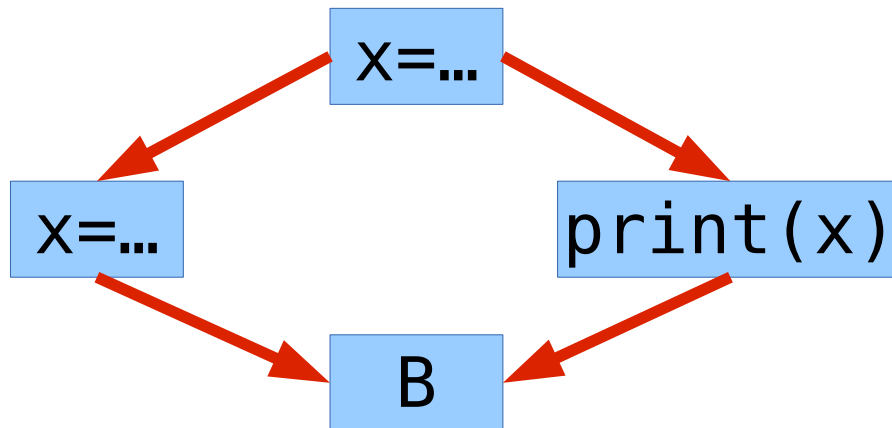
A Brief Example

- What should be tested for the different criteria?



Another Example

- What should be tested for the different criteria?



Moving On...

- Where else might we see graphs when thinking about program design?

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 - call graphs

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Graph coverage is a powerful & general concept.
You can apply it to many varied features of programs.

No One Clear Winner

- Is there a case where input space partitioning is weaker than CFG coverage?

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No One Clear Winner

- Is there a case where input space partitioning is weaker than CFG coverage?
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- Using just one approach may not be enough
 - But maybe there are other ways to evaluate adequacy...