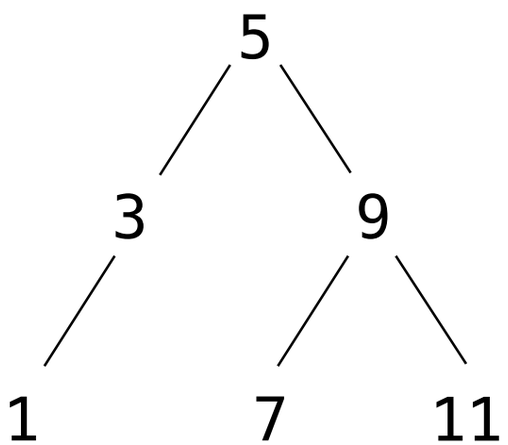
61A Lecture 25

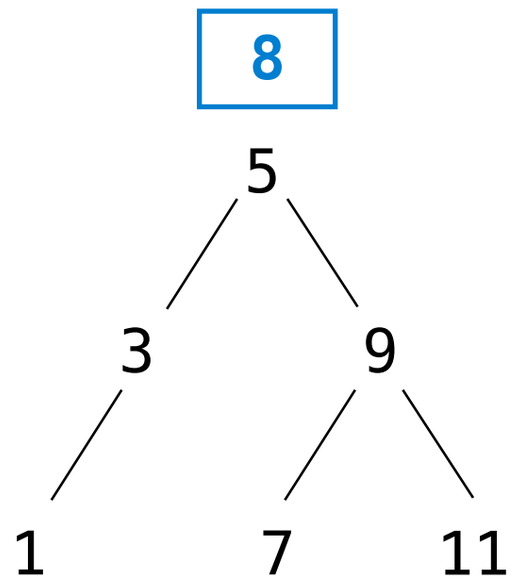
Friday, October 28

From Last Time: Adjoining to a Tree Set

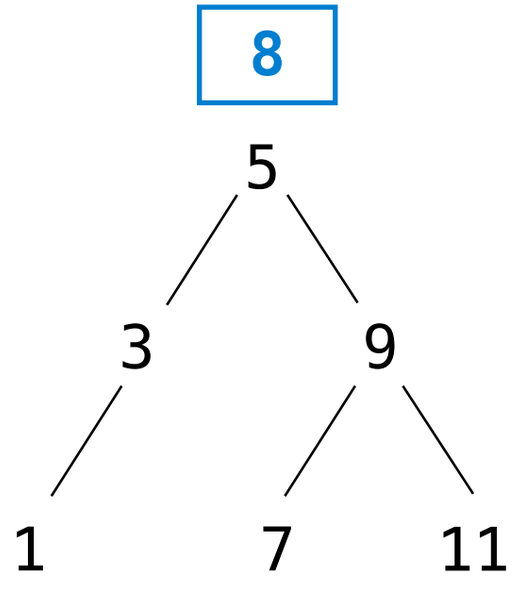
From Last Time: Adjoining to a Tree Set



From Last Time: Adjoining to a Tree Set

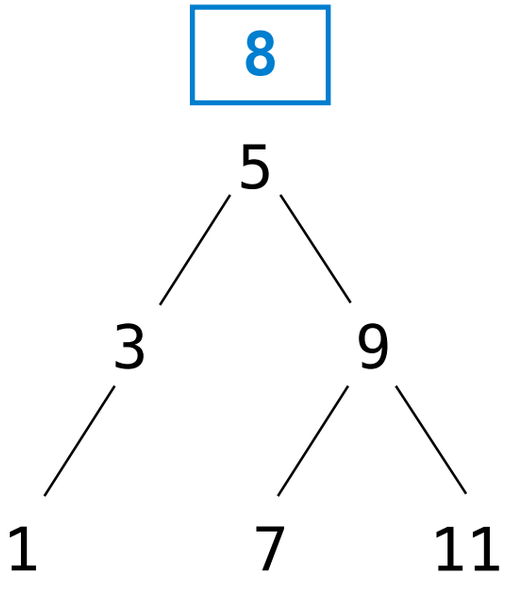


From Last Time: Adjoining to a Tree Set



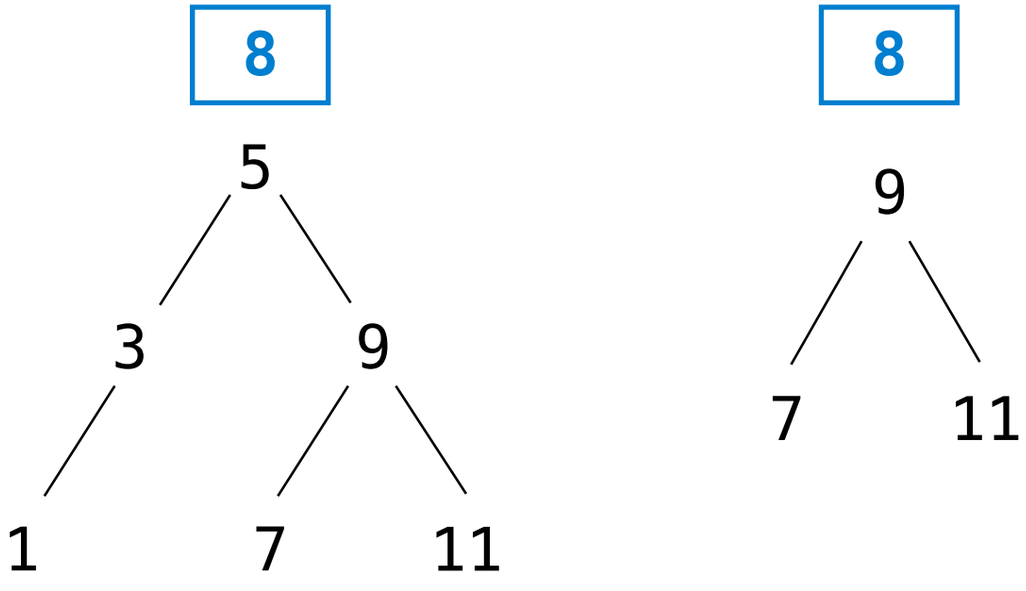
Right!

From Last Time: Adjoining to a Tree Set



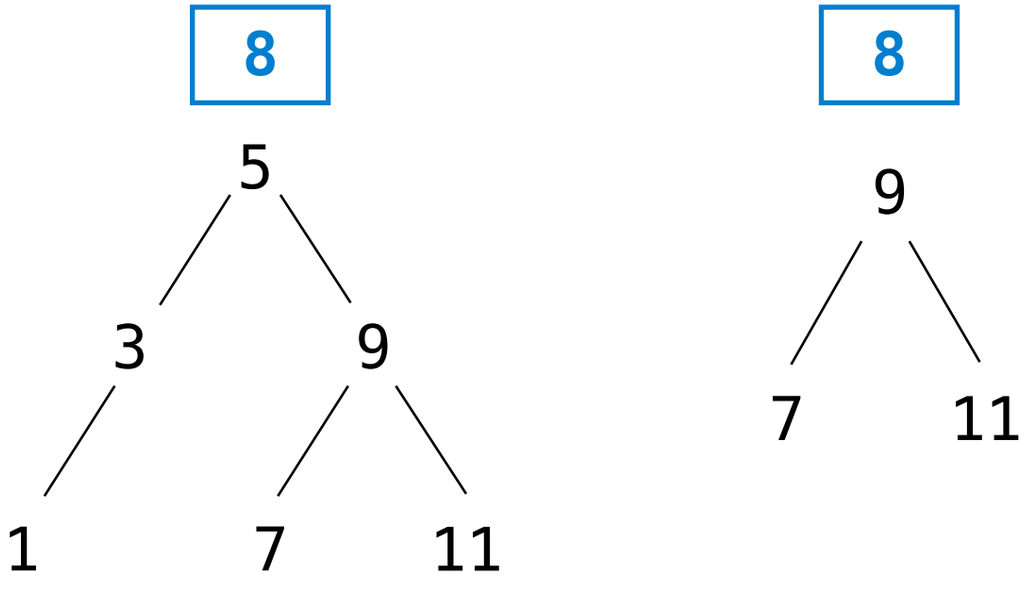
Right!

From Last Time: Adjoining to a Tree Set



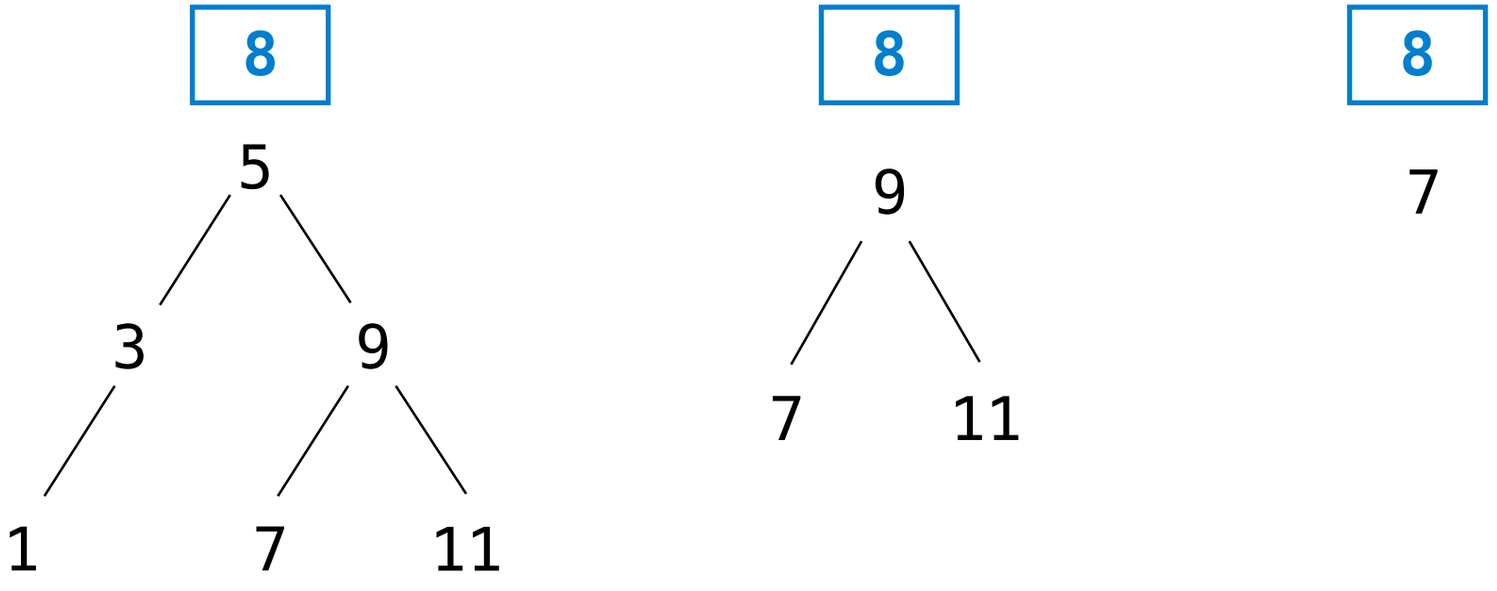
Right!

From Last Time: Adjoining to a Tree Set

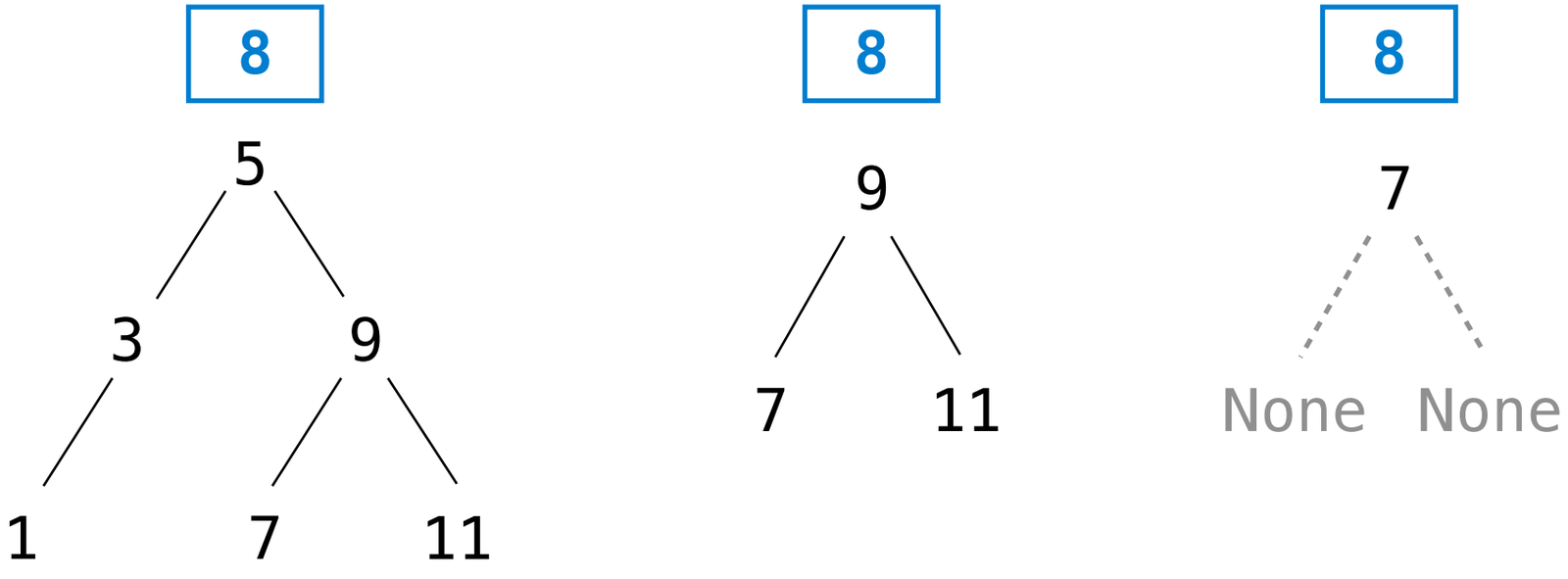


Right! *Left!*

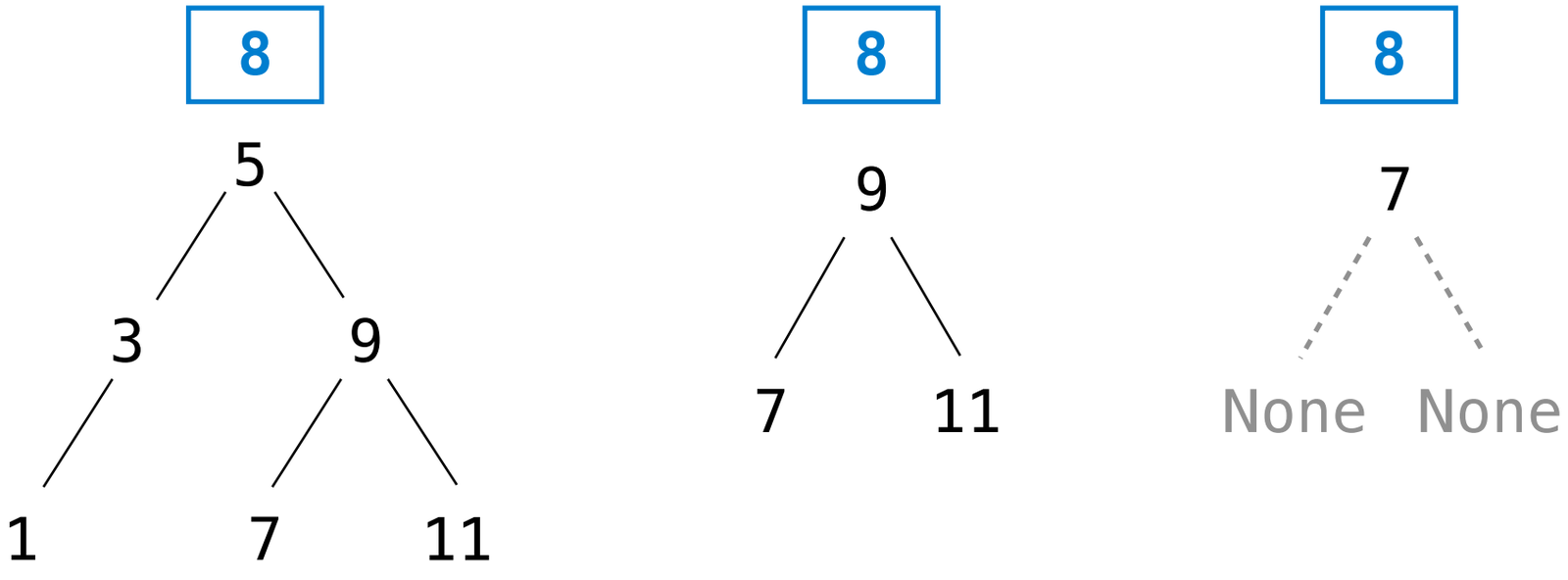
From Last Time: Adjoining to a Tree Set



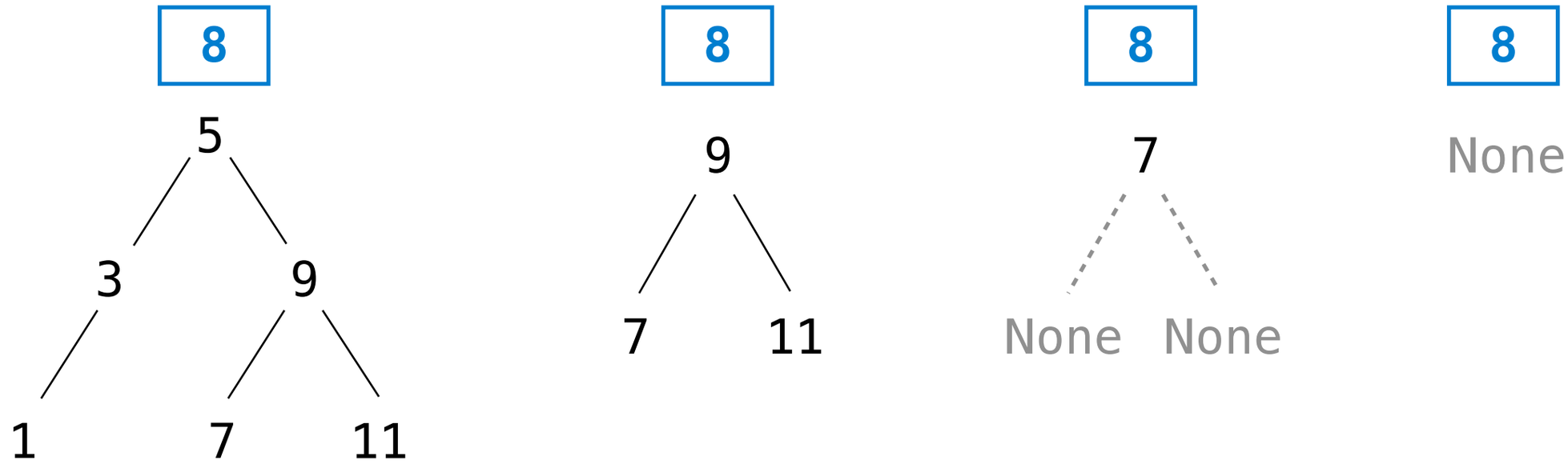
From Last Time: Adjoining to a Tree Set



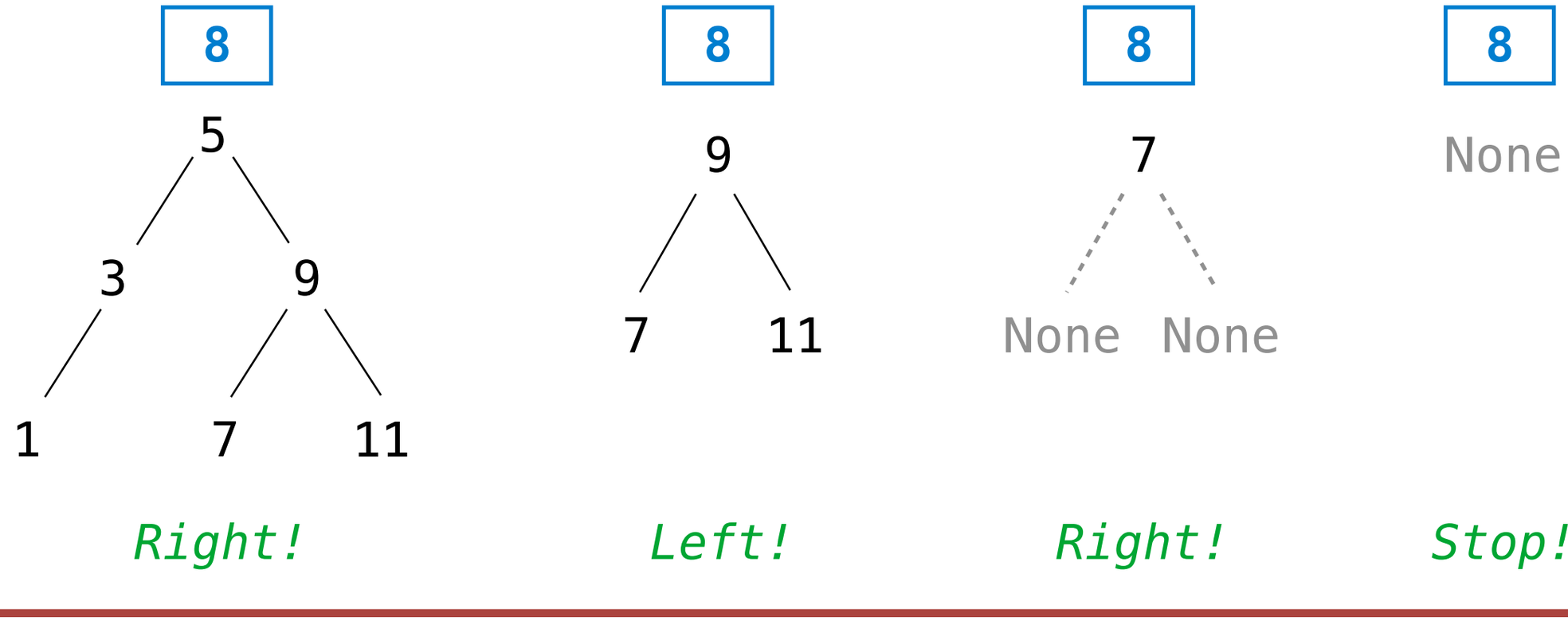
From Last Time: Adjoining to a Tree Set



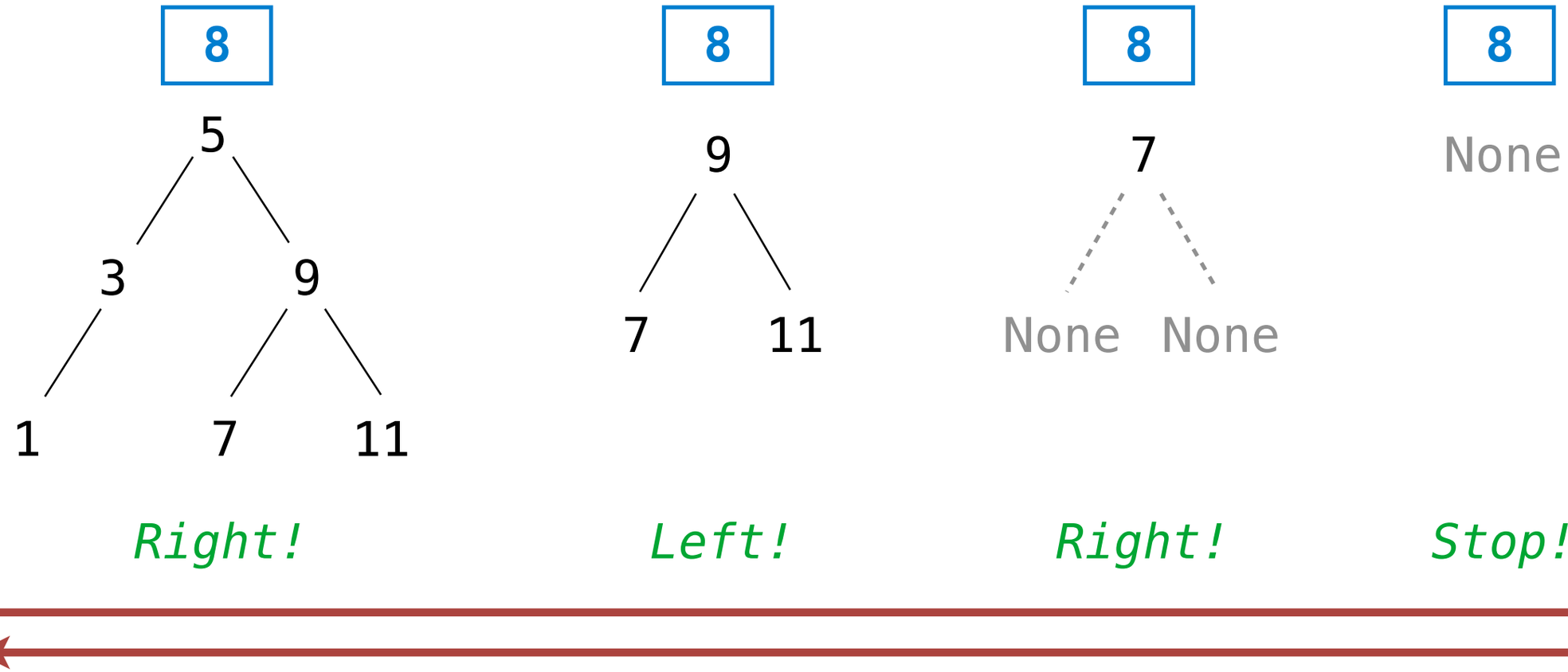
From Last Time: Adjoining to a Tree Set



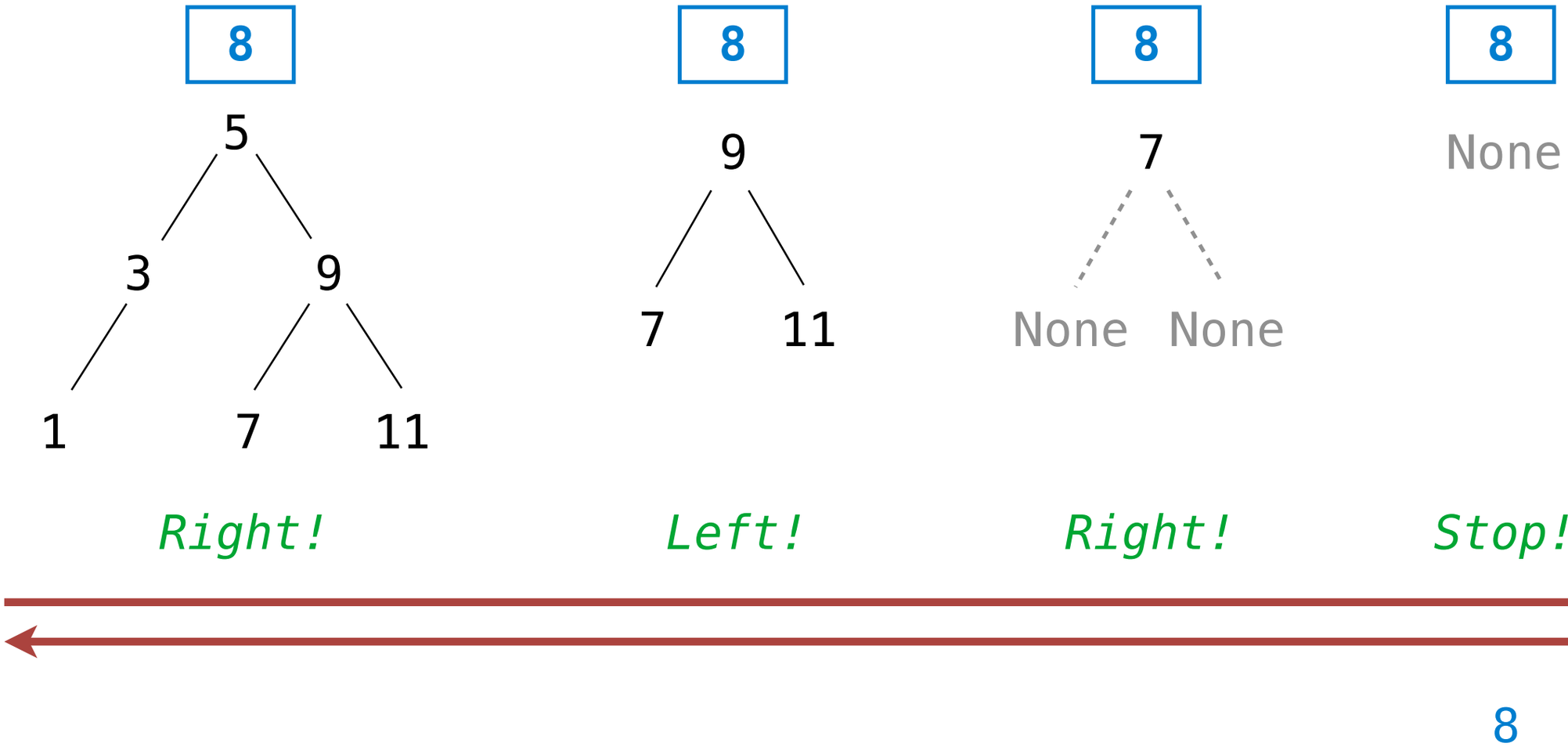
From Last Time: Adjoining to a Tree Set



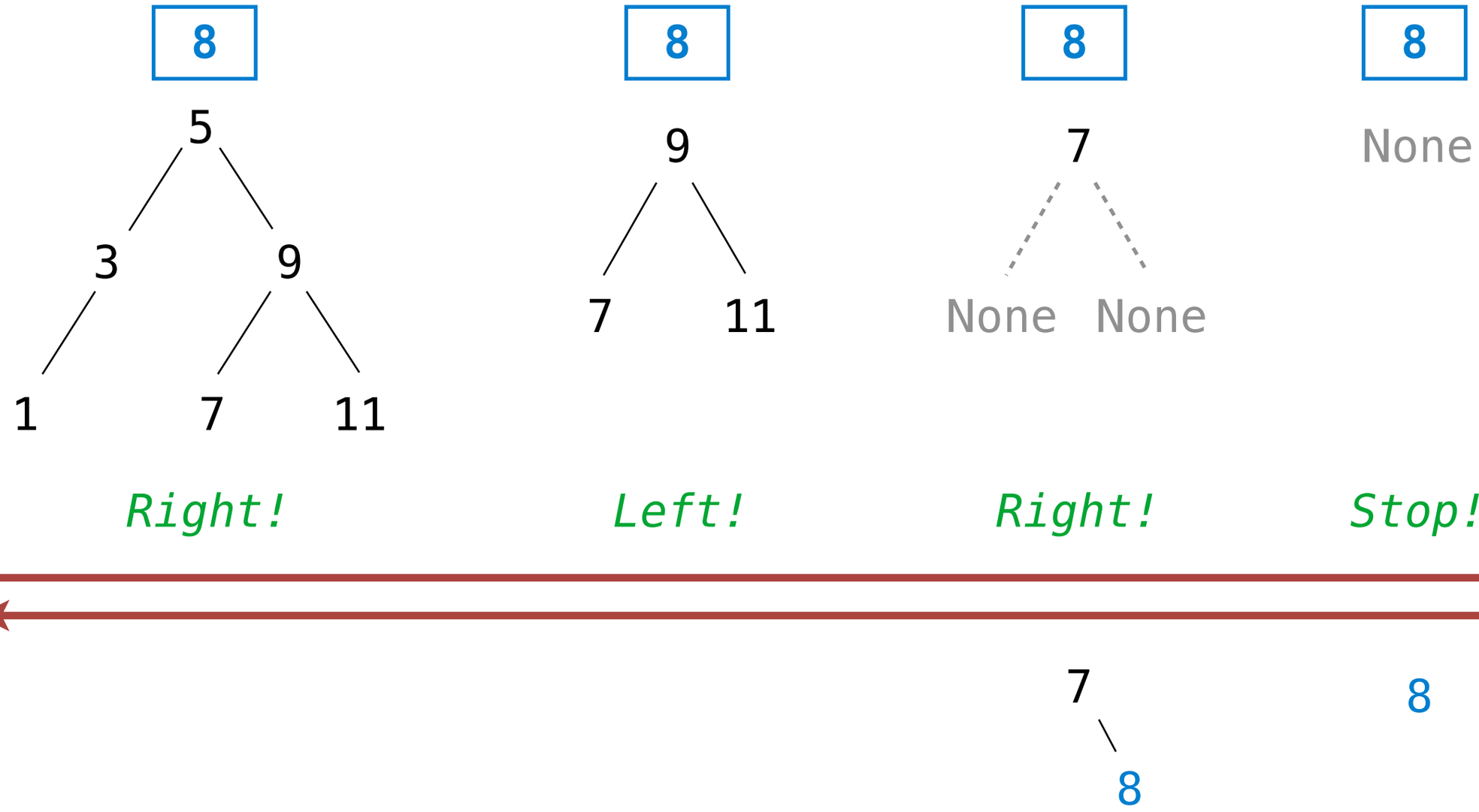
From Last Time: Adjoining to a Tree Set



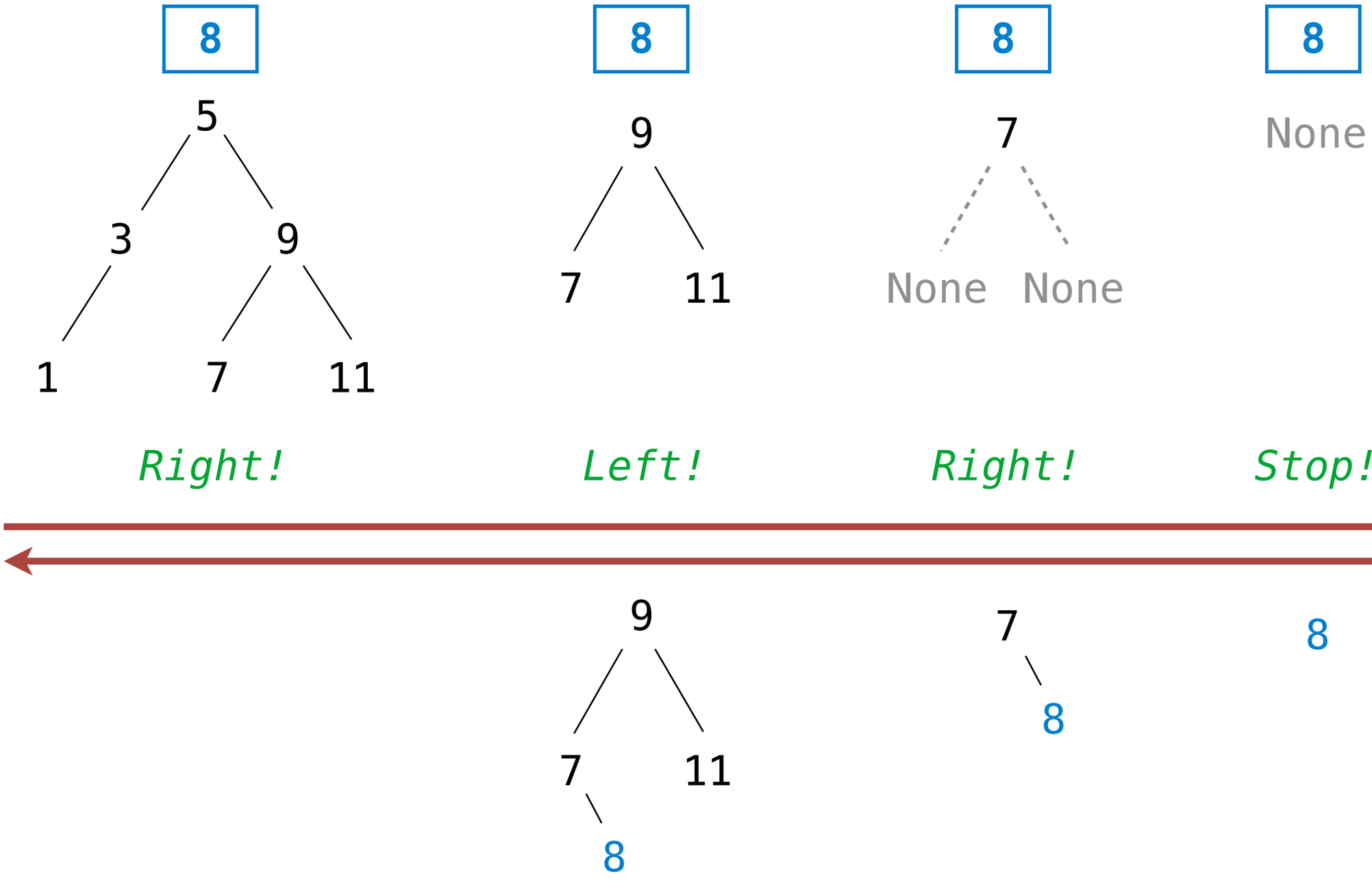
From Last Time: Adjoining to a Tree Set



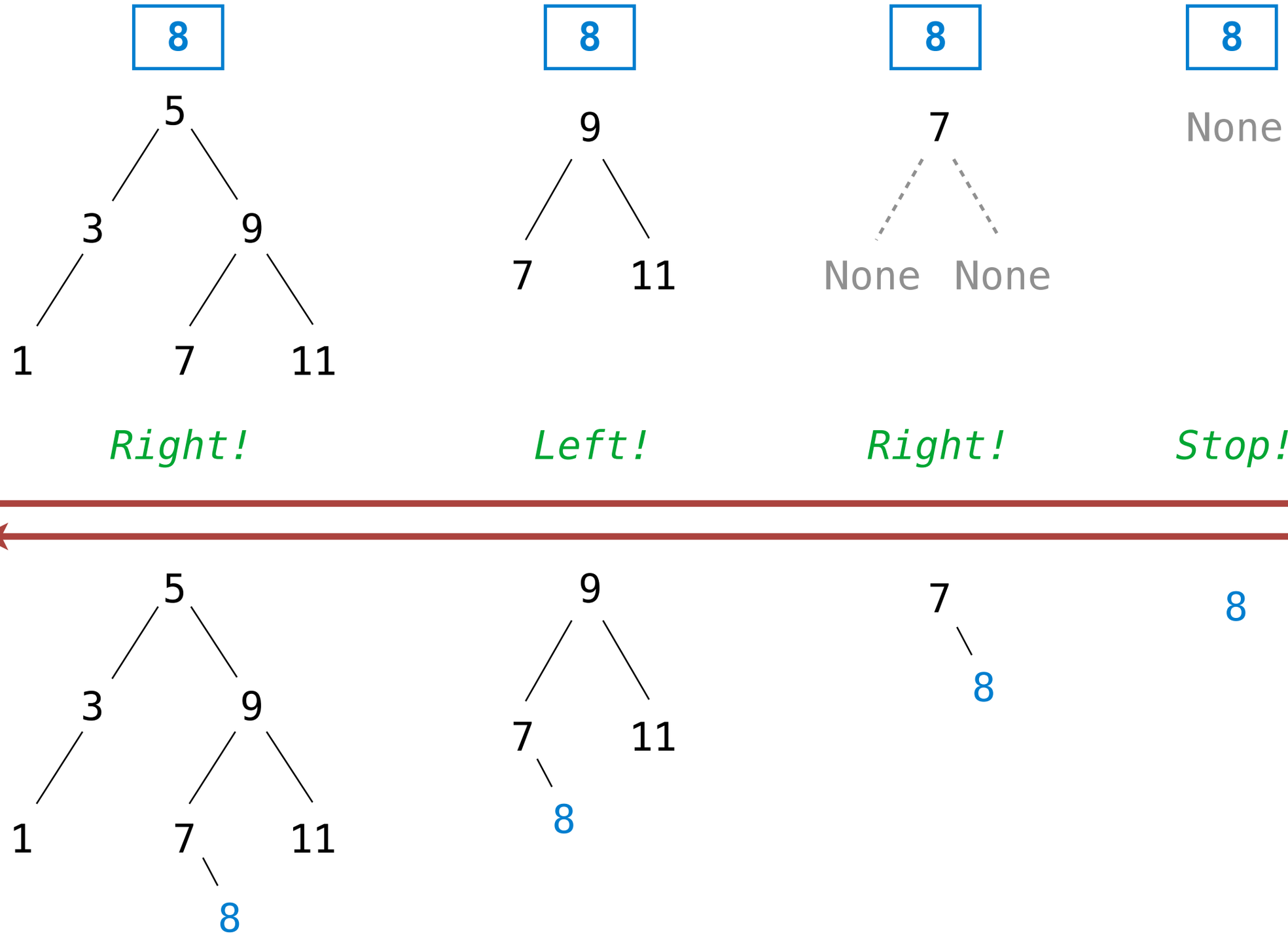
From Last Time: Adjoining to a Tree Set



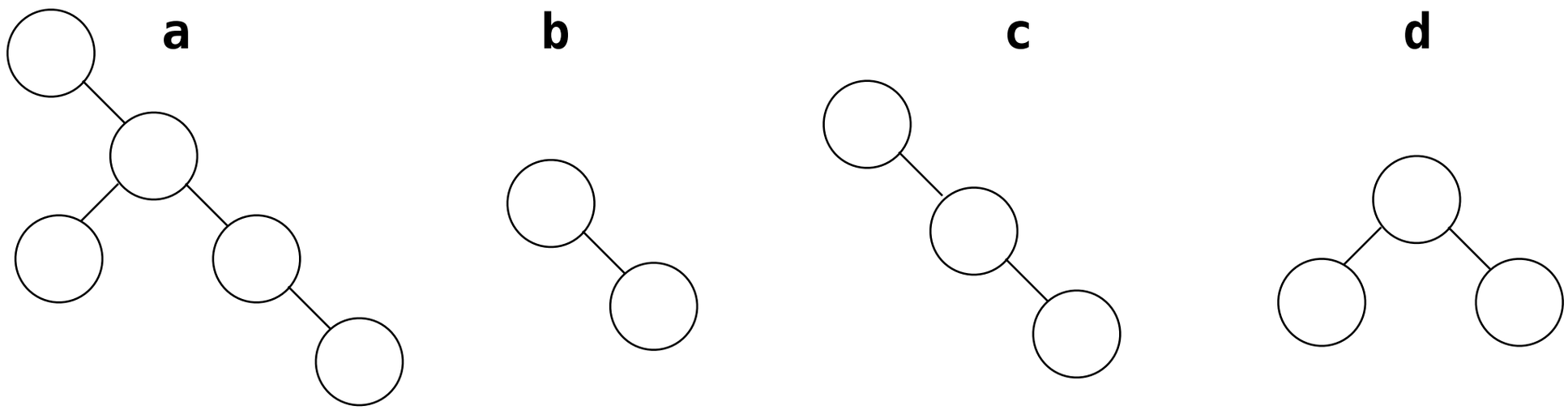
From Last Time: Adjoining to a Tree Set



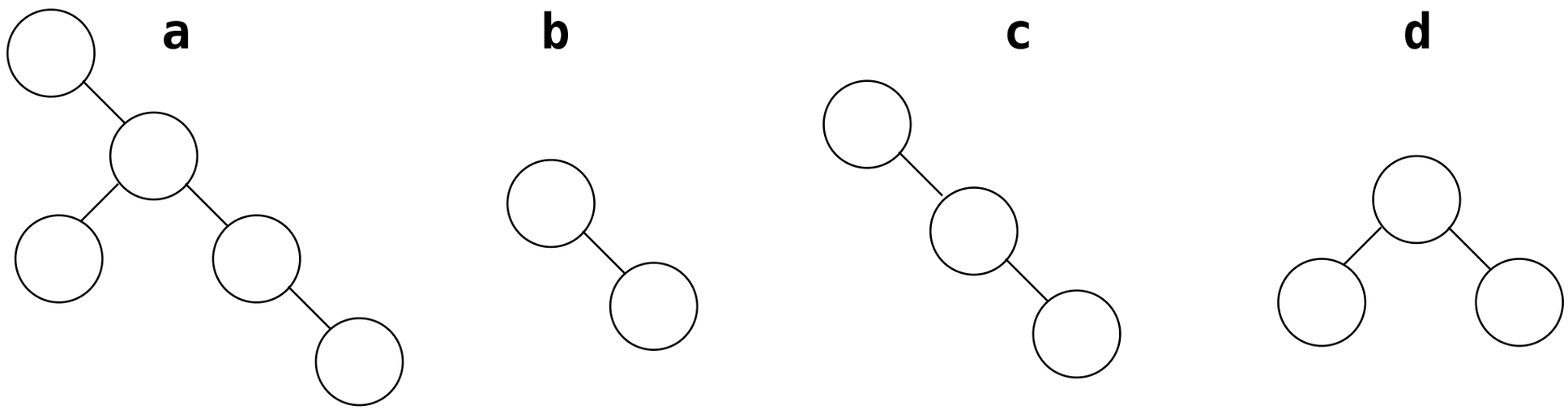
From Last Time: Adjoining to a Tree Set



From the Exam: Pruned Trees

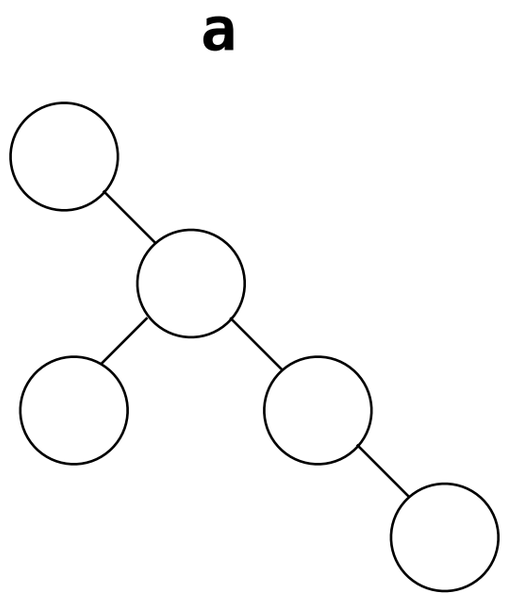


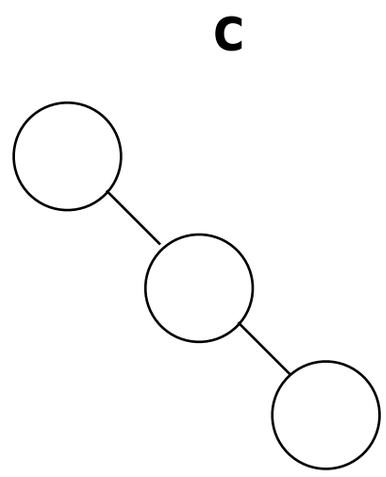
From the Exam: Pruned Trees



	(a,b)	(a,c)	(a,d)
pruned	True	True	False

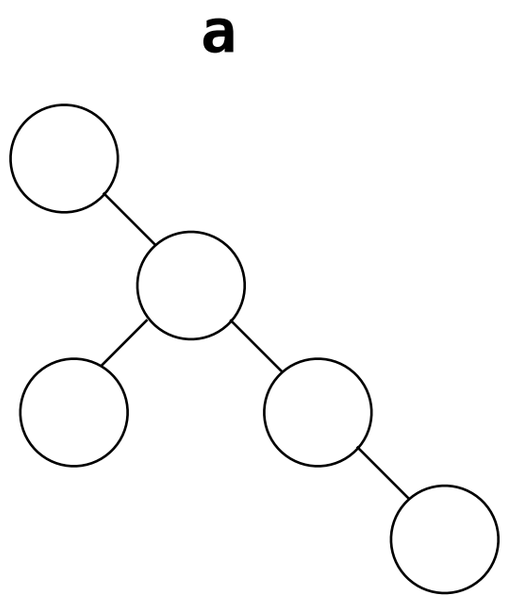
From the Exam: Pruned Trees

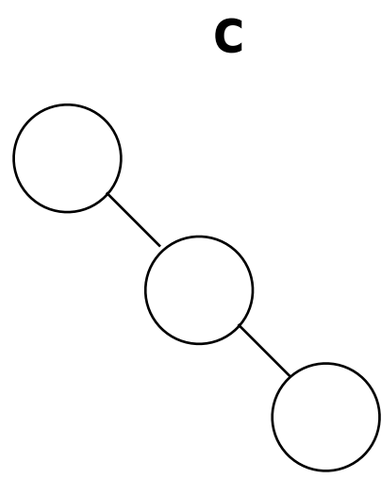




From the Exam: Pruned Trees

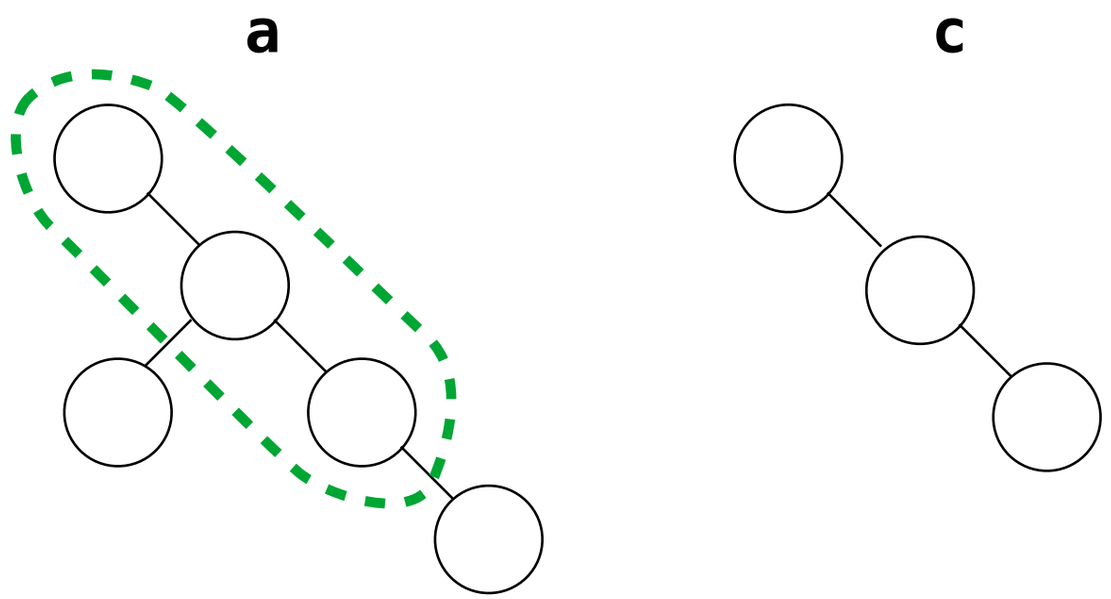
```
pruned(a, c)
```





From the Exam: Pruned Trees

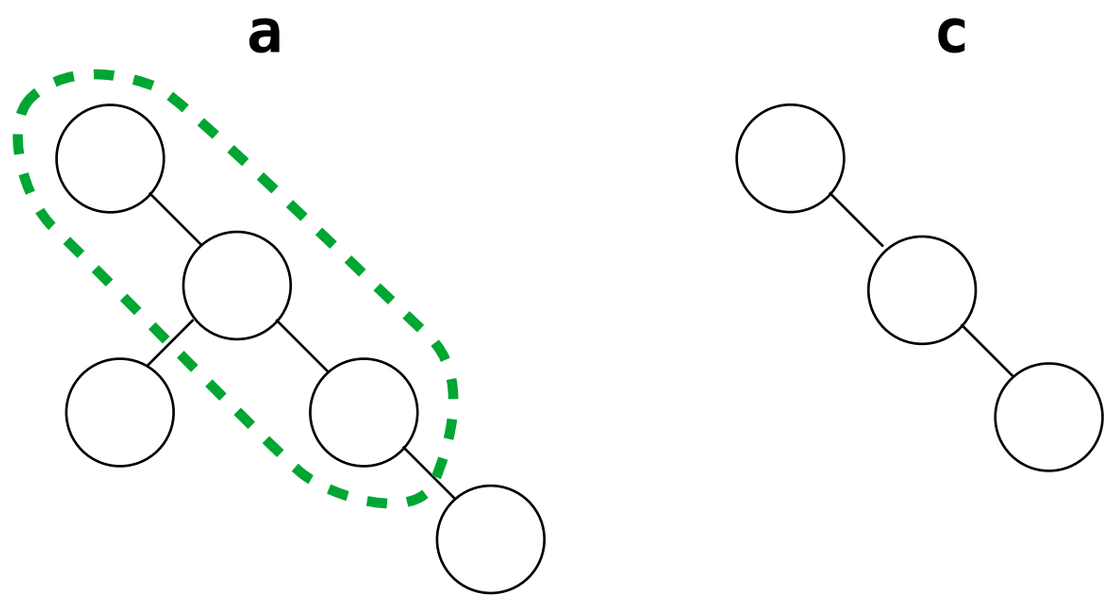
```
pruned(a, c)
```



From the Exam: Pruned Trees

`pruned(a, c)`

implies

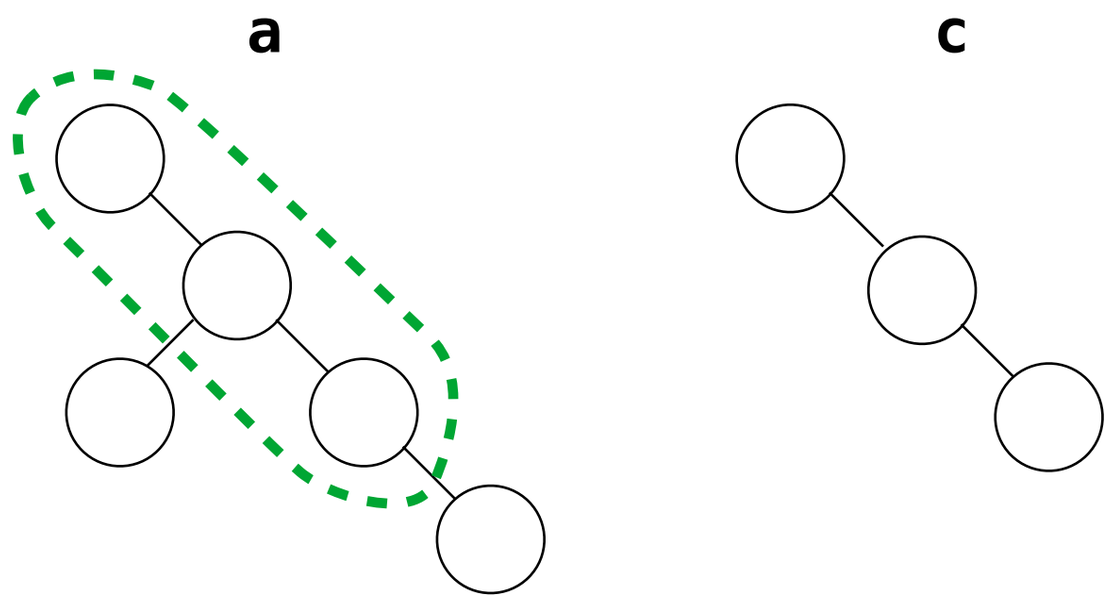


From the Exam: Pruned Trees

```
pruned(a, c)
```

implies

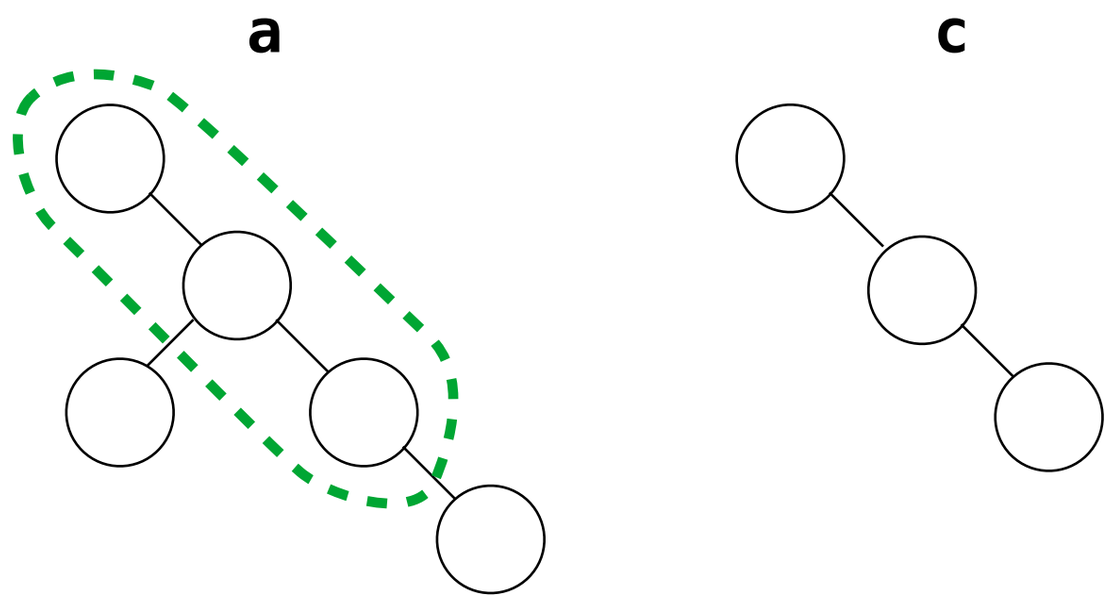
```
pruned(a.right, c.right)
```



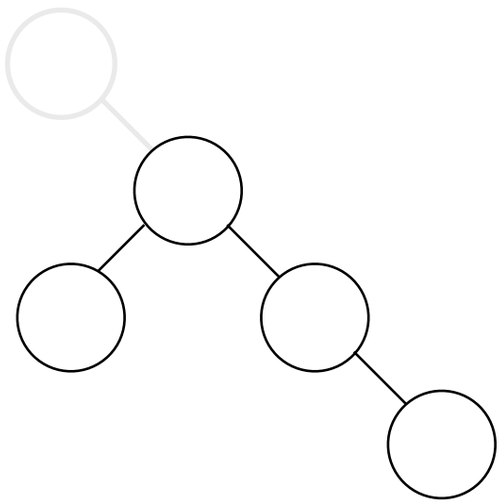
From the Exam: Pruned Trees

`pruned(a, c)`

implies



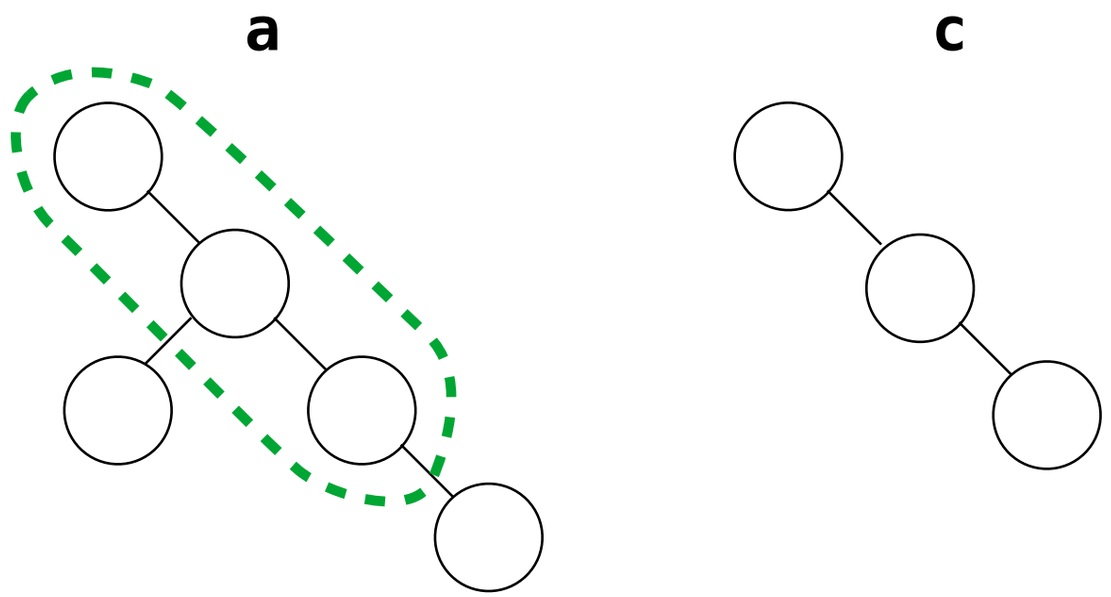
`pruned(a.right, c.right)`



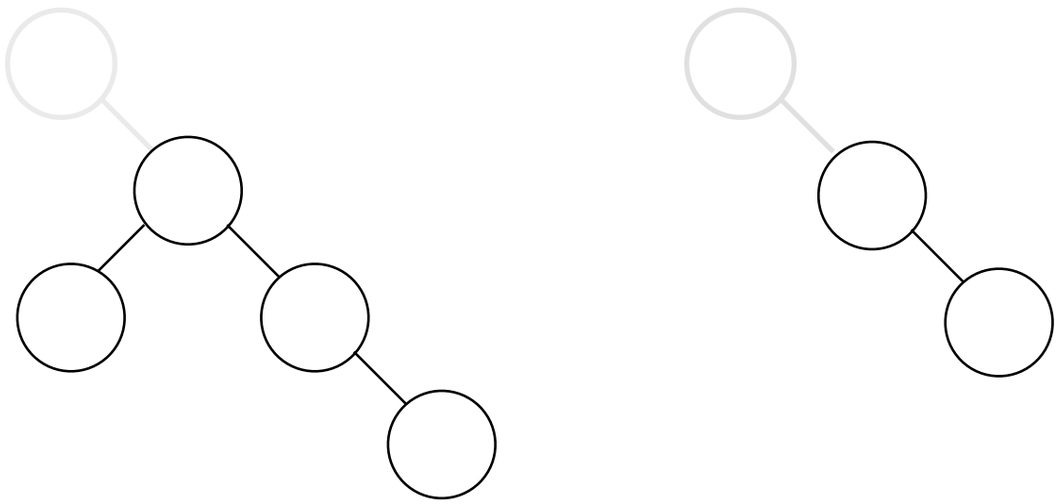
From the Exam: Pruned Trees

`pruned(a, c)`

implies



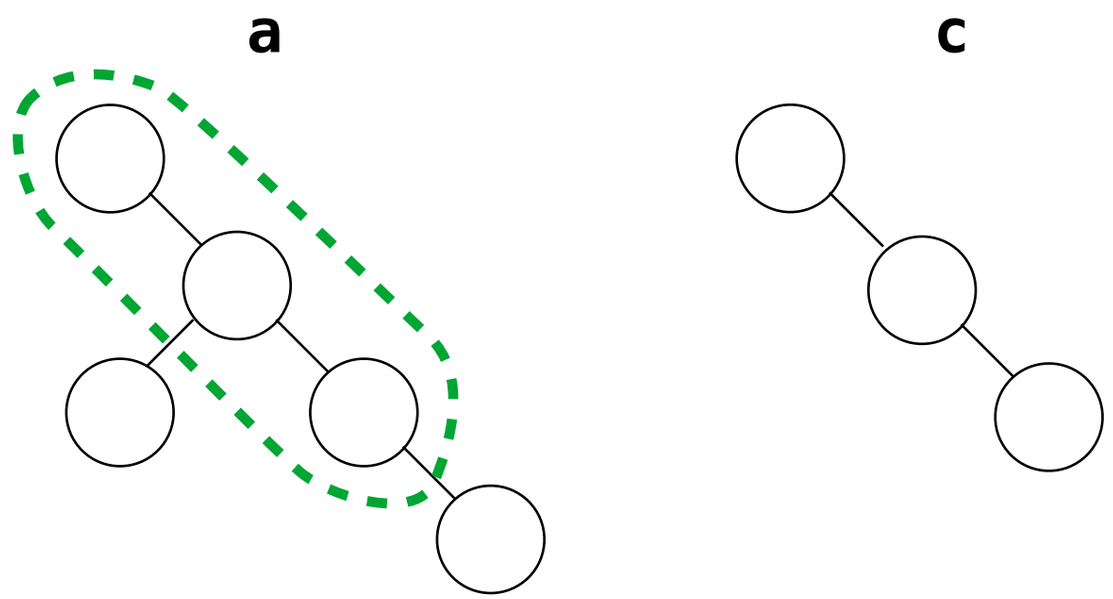
`pruned(a.right, c.right)`



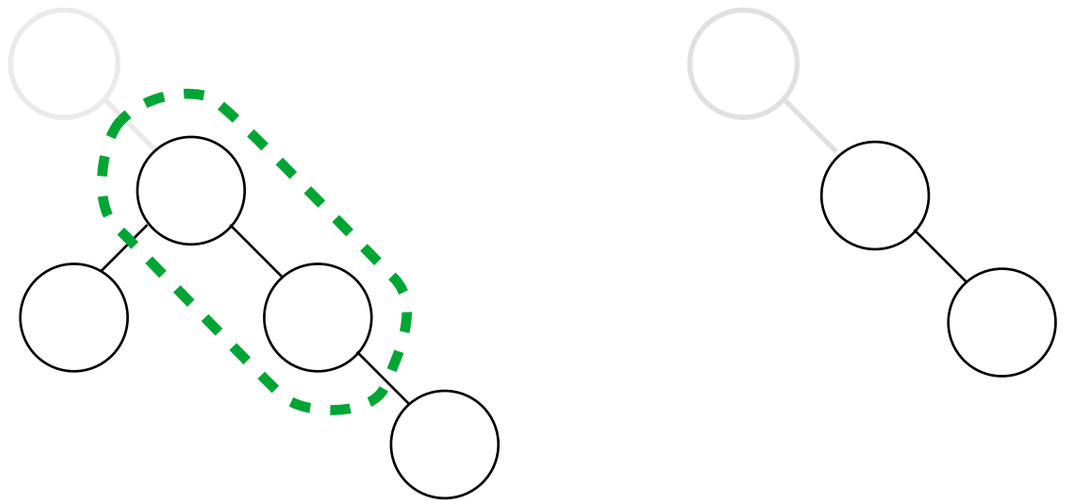
From the Exam: Pruned Trees

`pruned(a, c)`

implies

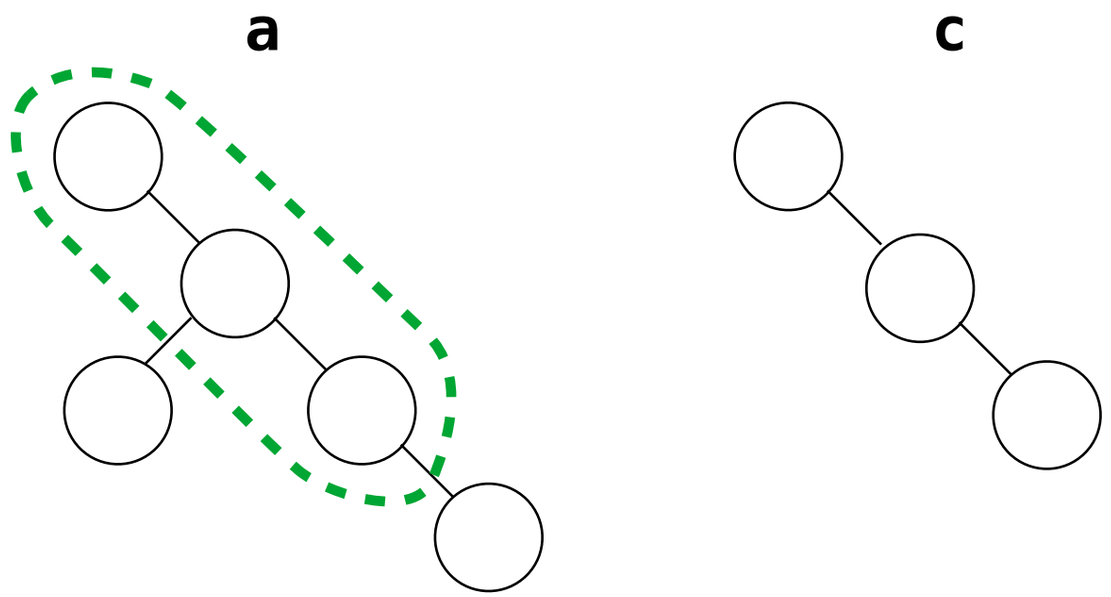


`pruned(a.right, c.right)`



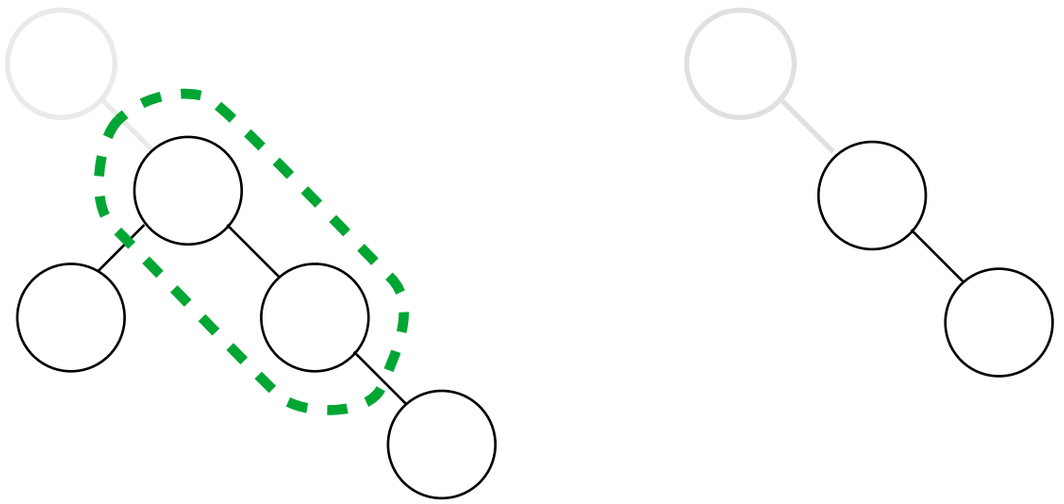
From the Exam: Pruned Trees

`pruned(a, c)`



implies

`pruned(a.right, c.right)`

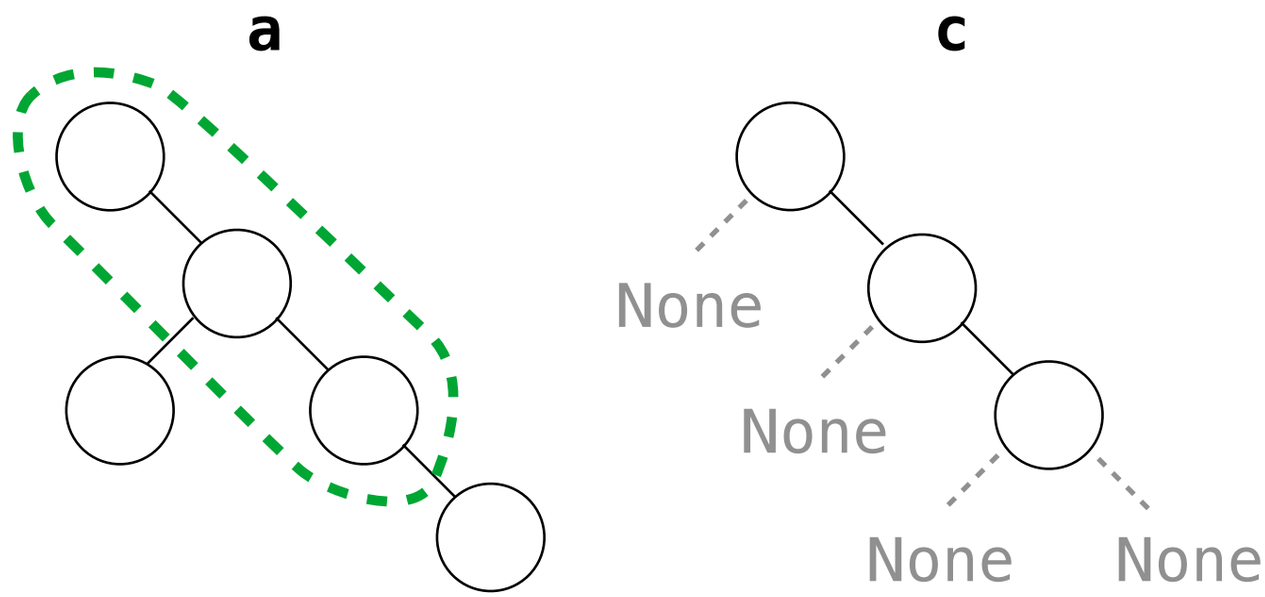


`what about c.left?`

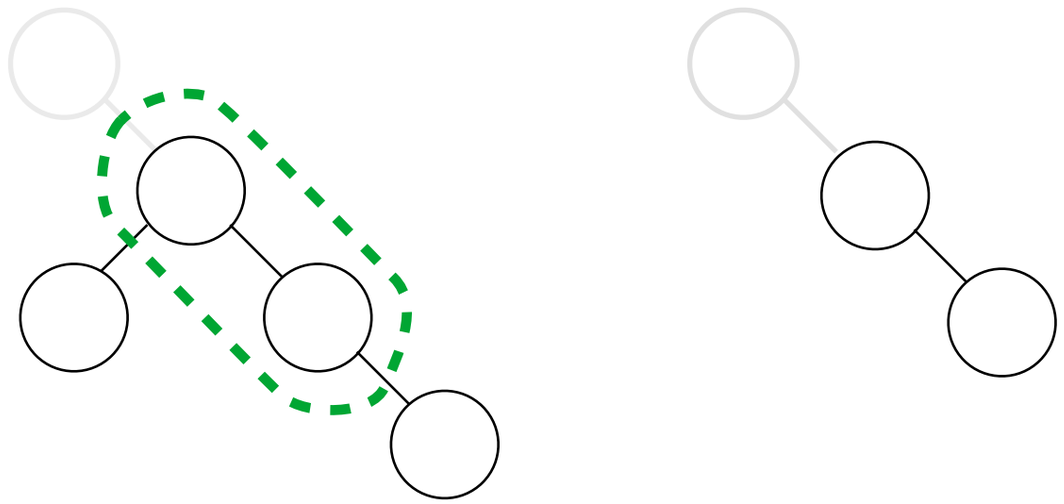
From the Exam: Pruned Trees

`pruned(a, c)`

implies



`pruned(a.right, c.right)`

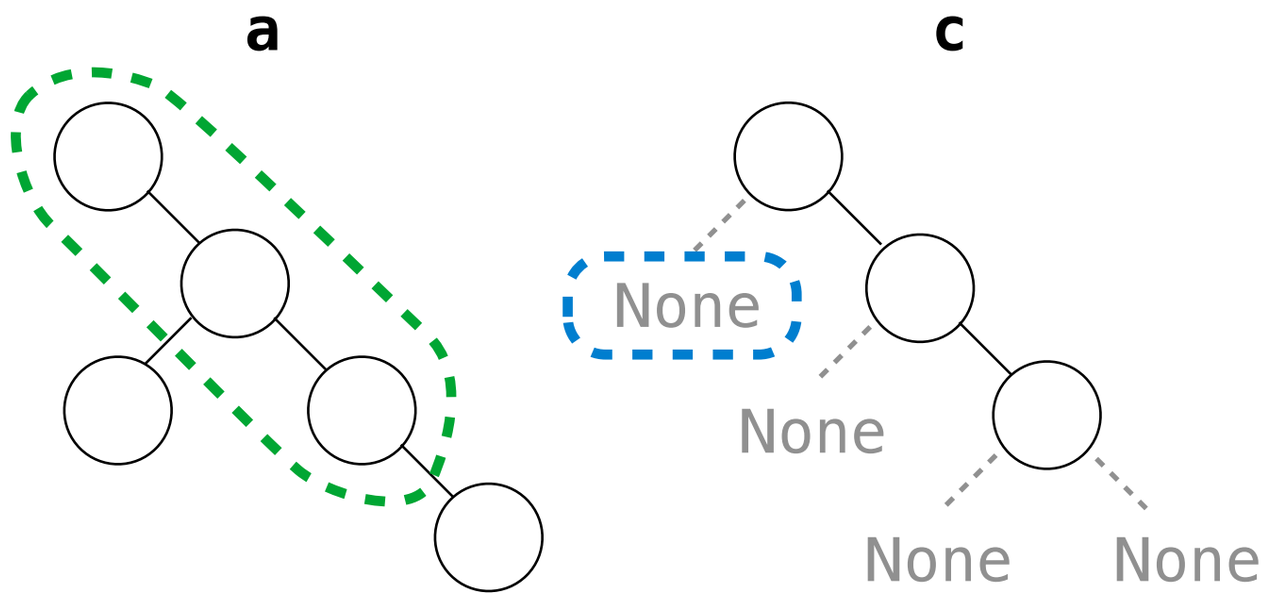


`what about c.left?`

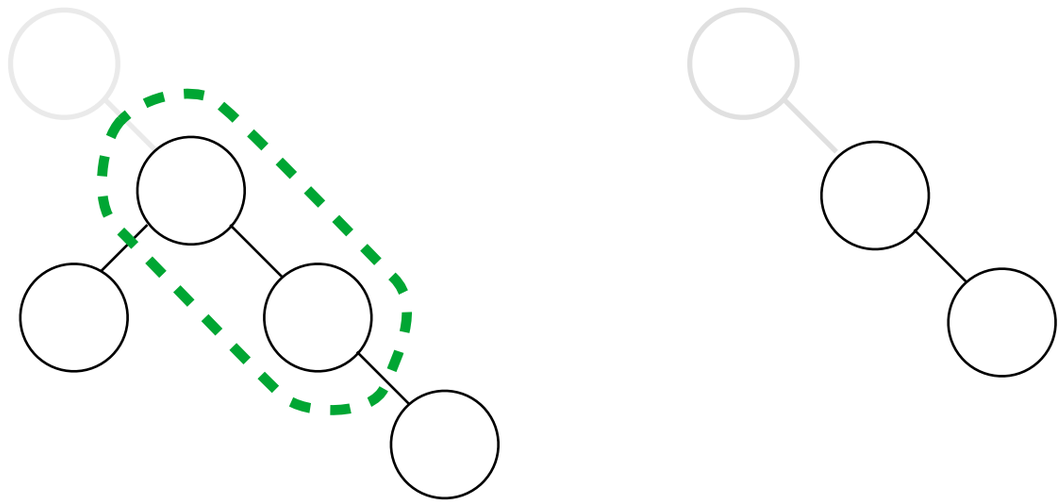
From the Exam: Pruned Trees

`pruned(a, c)`

implies

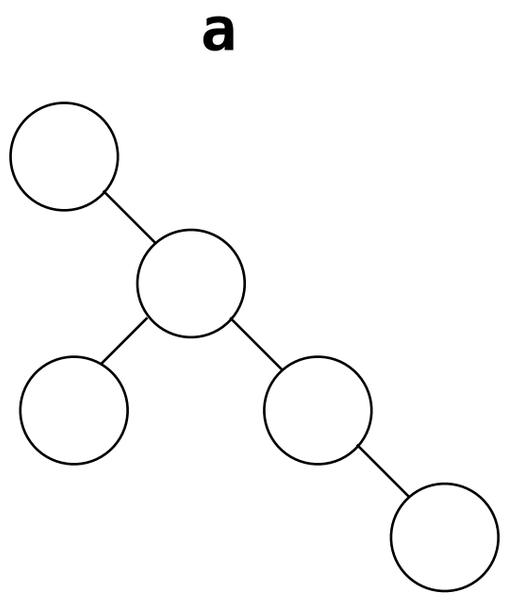


`pruned(a.right, c.right)`



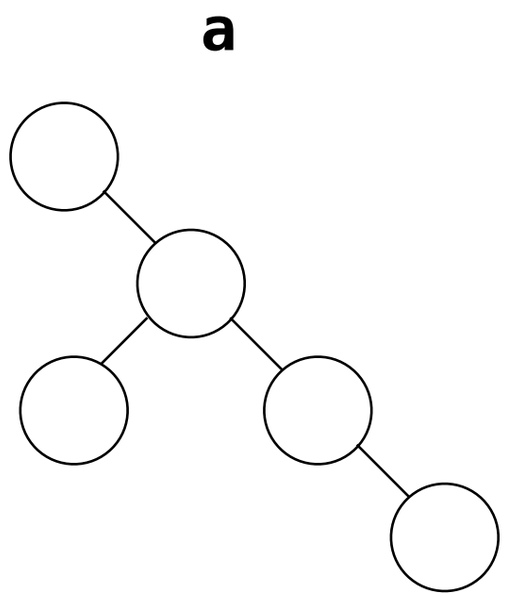
`what about c.left?`

From the Exam: Pruned Trees



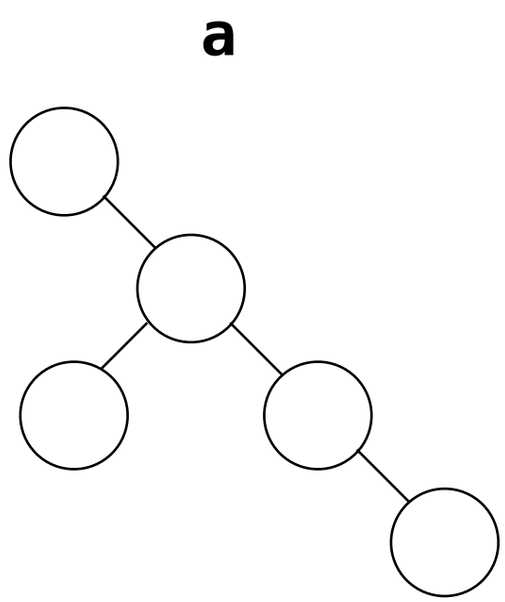
From the Exam: Pruned Trees

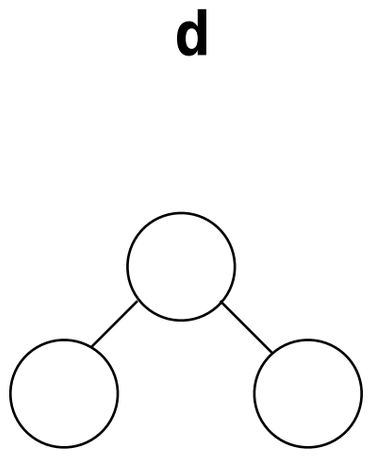
```
pruned(a, d)
```



From the Exam: Pruned Trees

```
pruned(a, d)
```

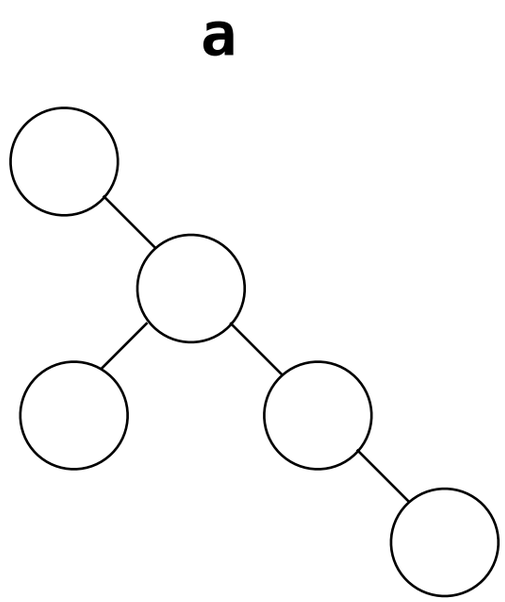


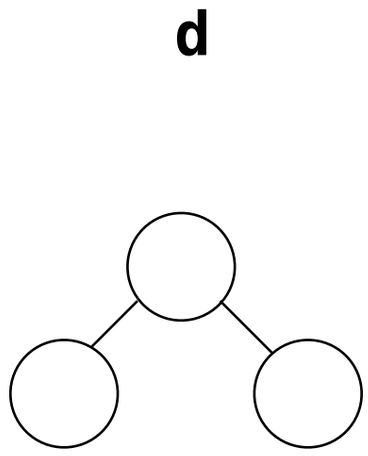


From the Exam: Pruned Trees

`pruned(a, d)`

would imply

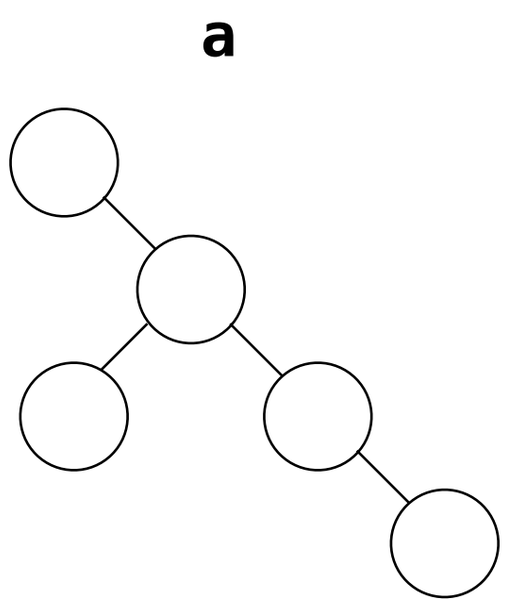


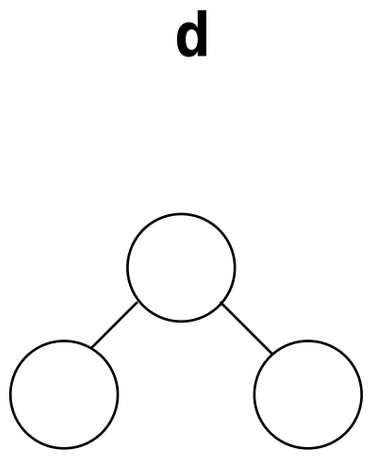


From the Exam: Pruned Trees

`pruned(a, d)`

would imply





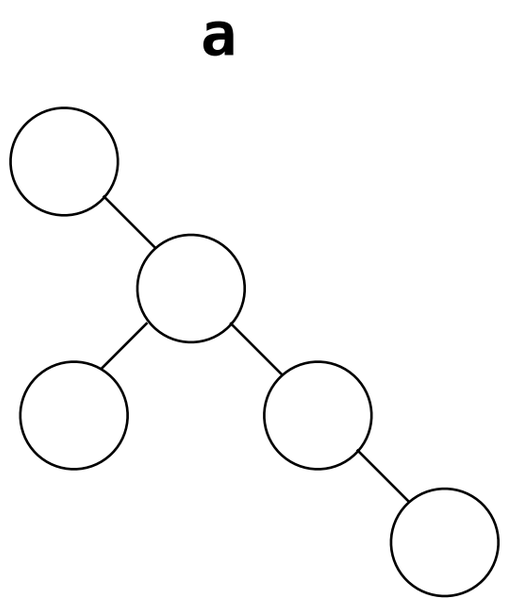
`pruned(a.left, d.left)`

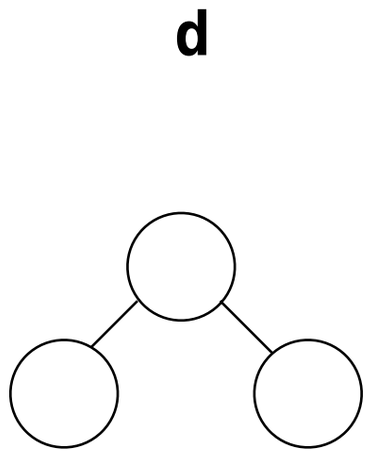
From the Exam: Pruned Trees

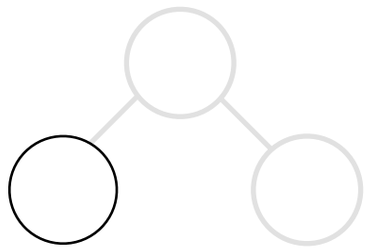
`pruned(a, d)`

would imply

`pruned(a.left, d.left)`





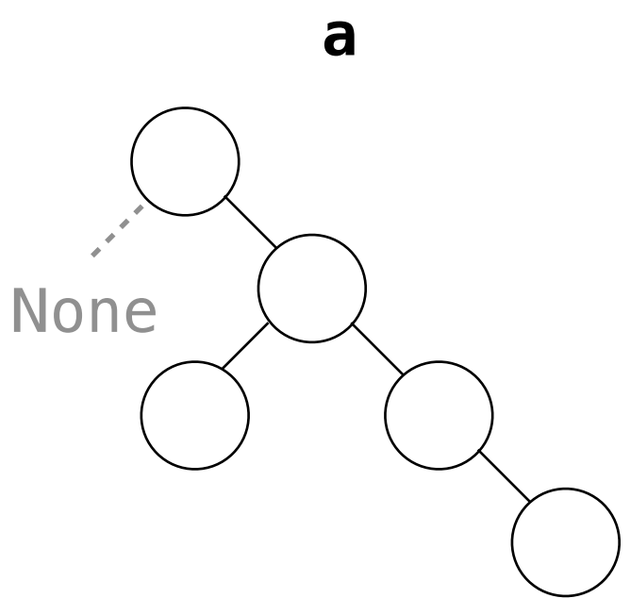


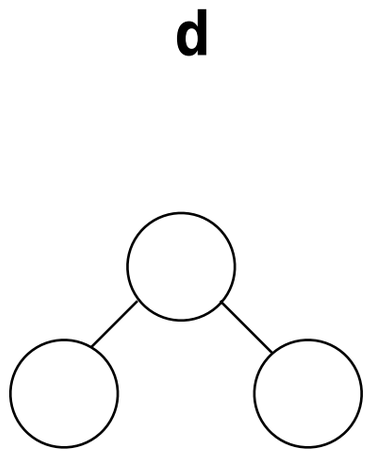
From the Exam: Pruned Trees

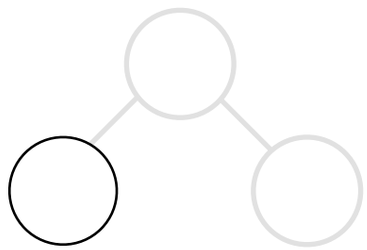
```
pruned(a, d)
```

would imply

```
pruned(a.left, d.left)
```





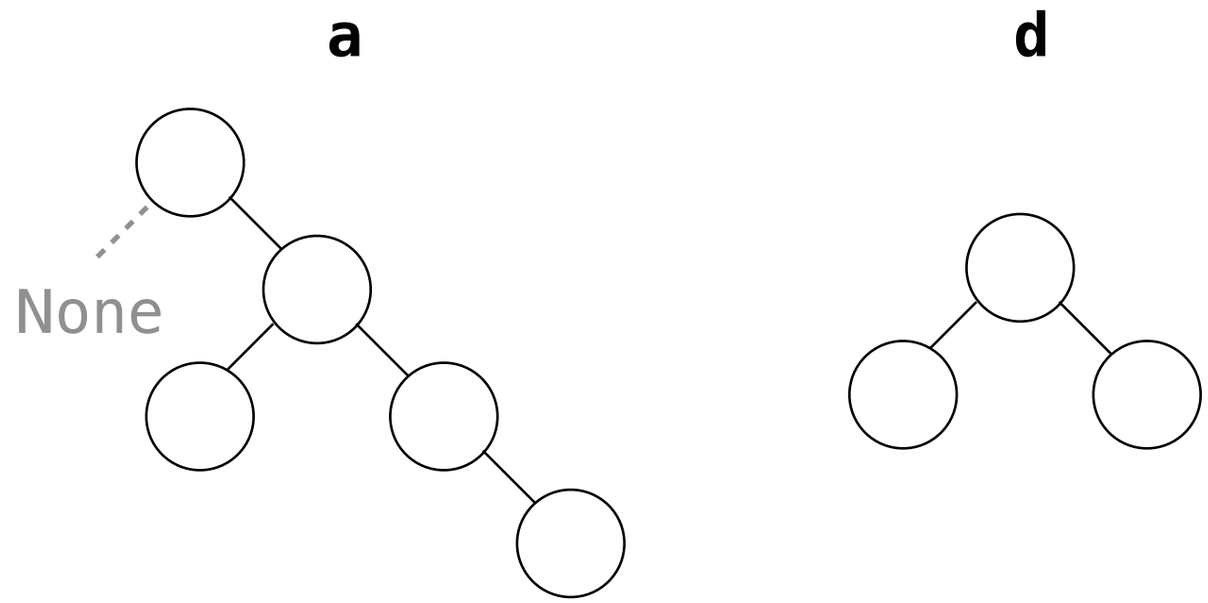


From the Exam: Pruned Trees

`pruned(a, d)`

would imply

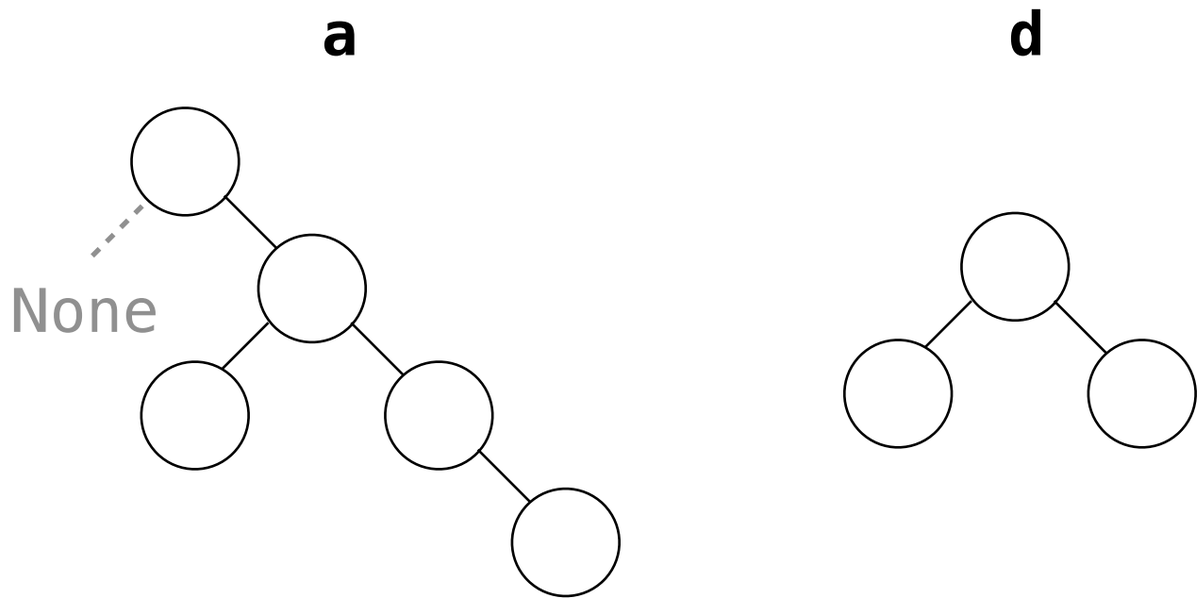
`pruned(a.left, d.left)`



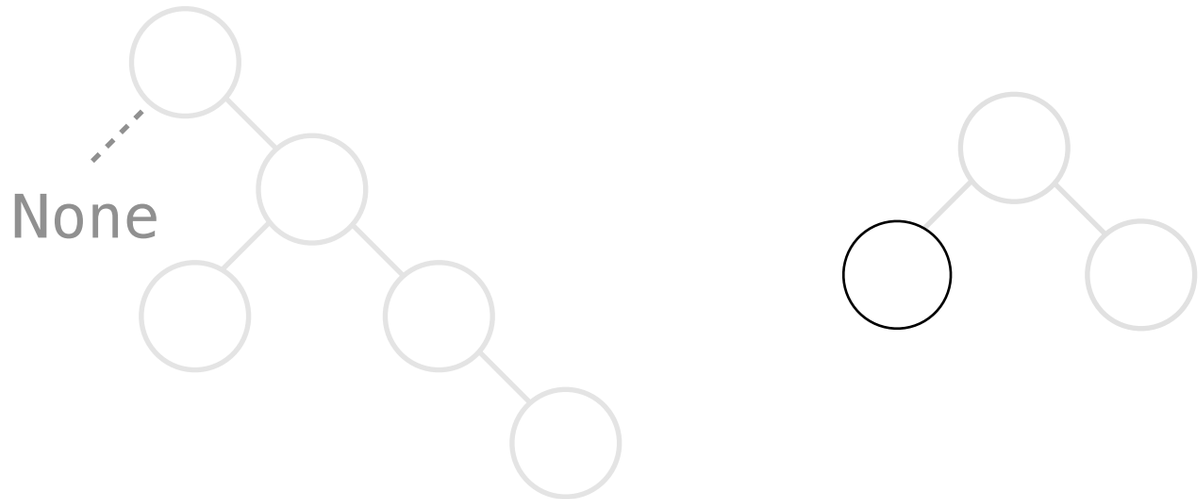
From the Exam: Pruned Trees

`pruned(a, d)`

would imply



`pruned(a.left, d.left)`



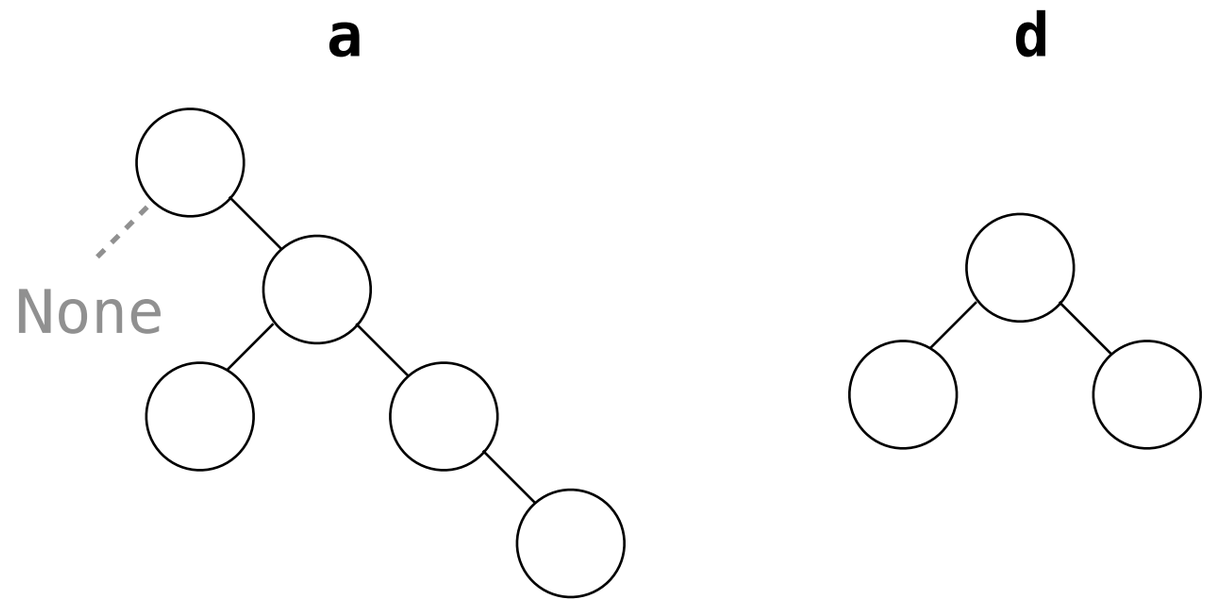
`None`

From the Exam: Pruned Trees

`pruned(a, d)`

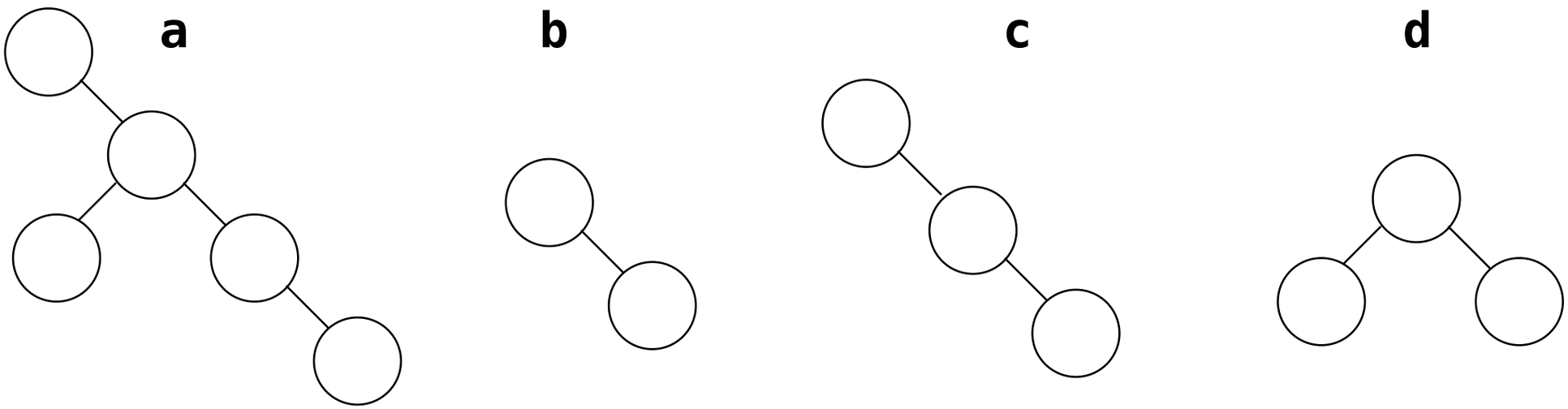
would imply

`pruned(a.left, d.left)`



`None` `Not None`

From the Exam: Pruned Trees



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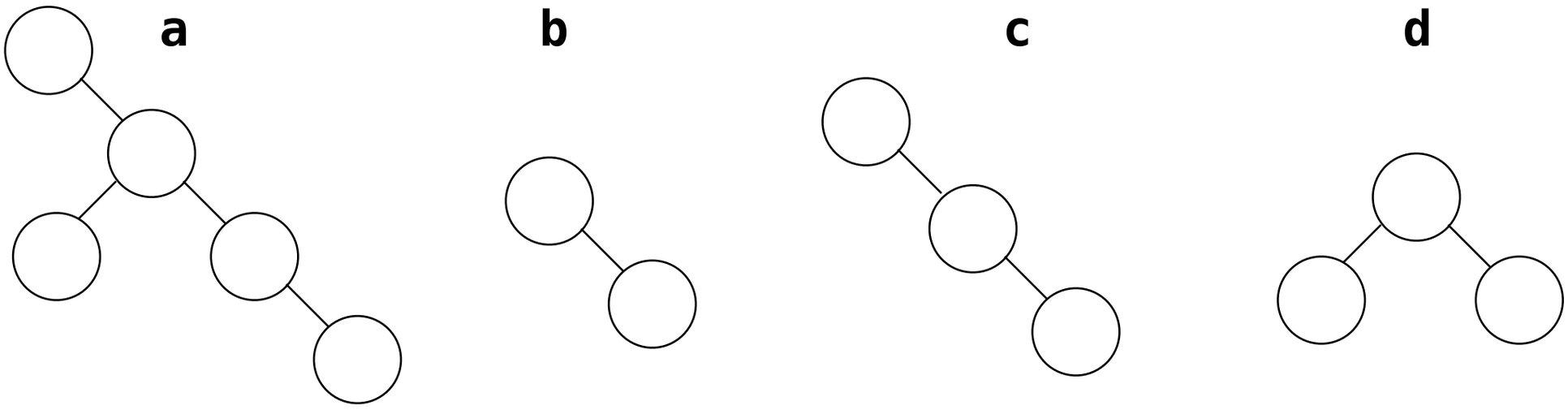

Recursive call: both branches are pruned as well

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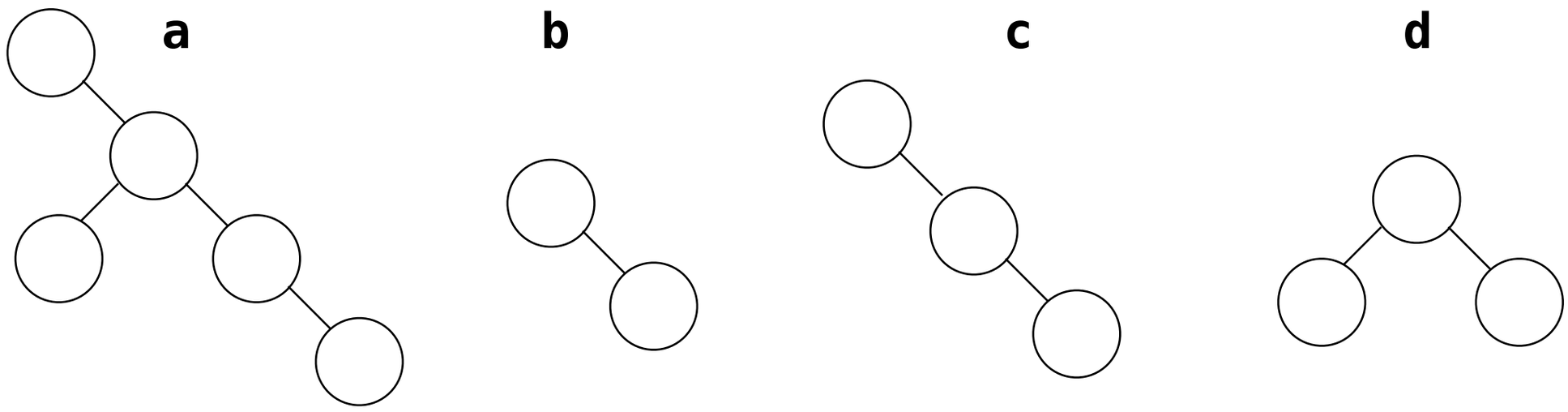

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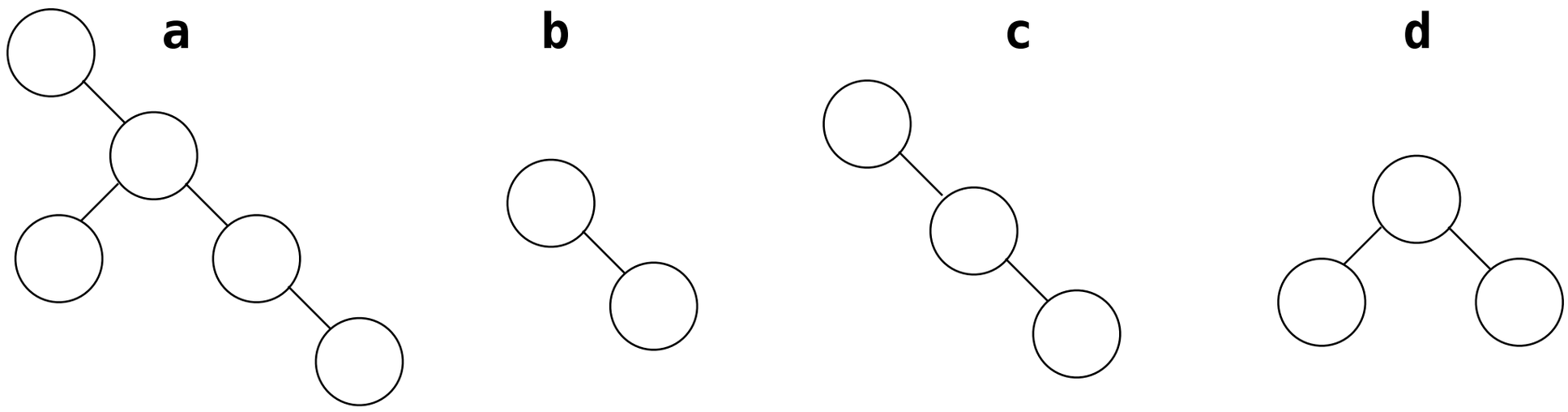


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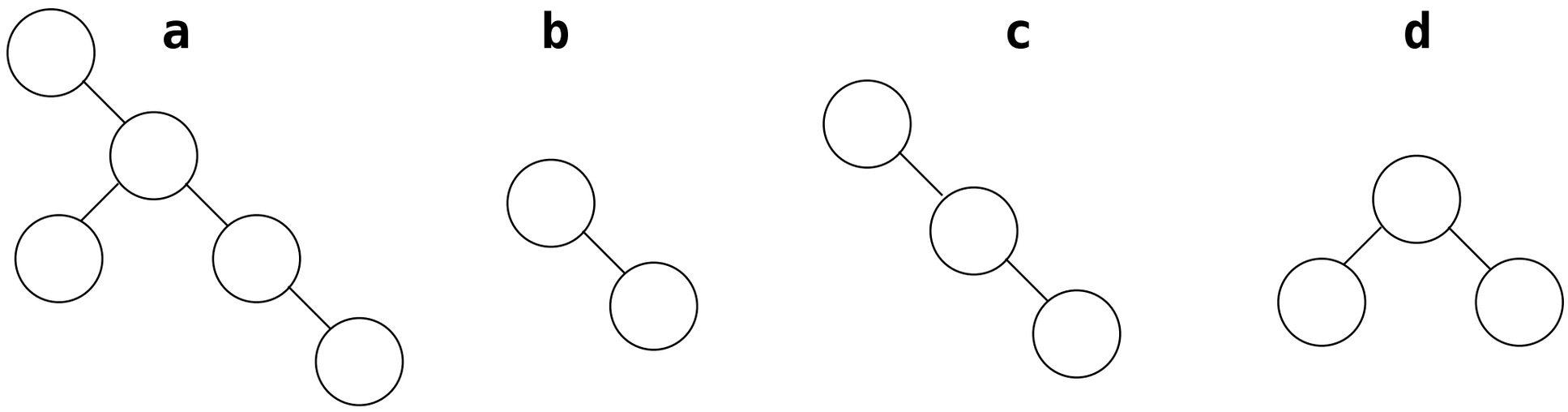


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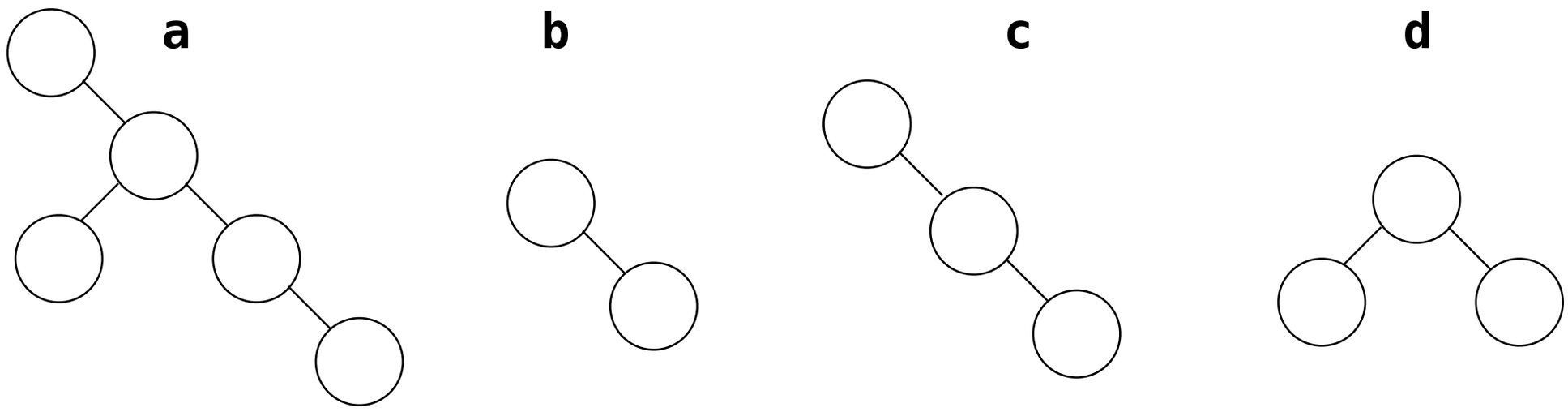


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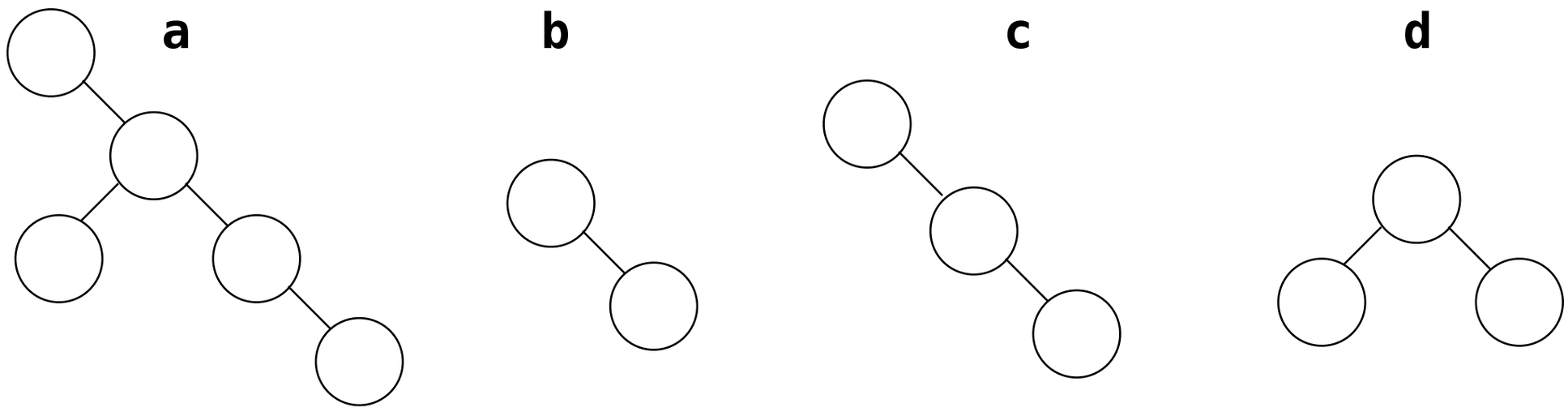


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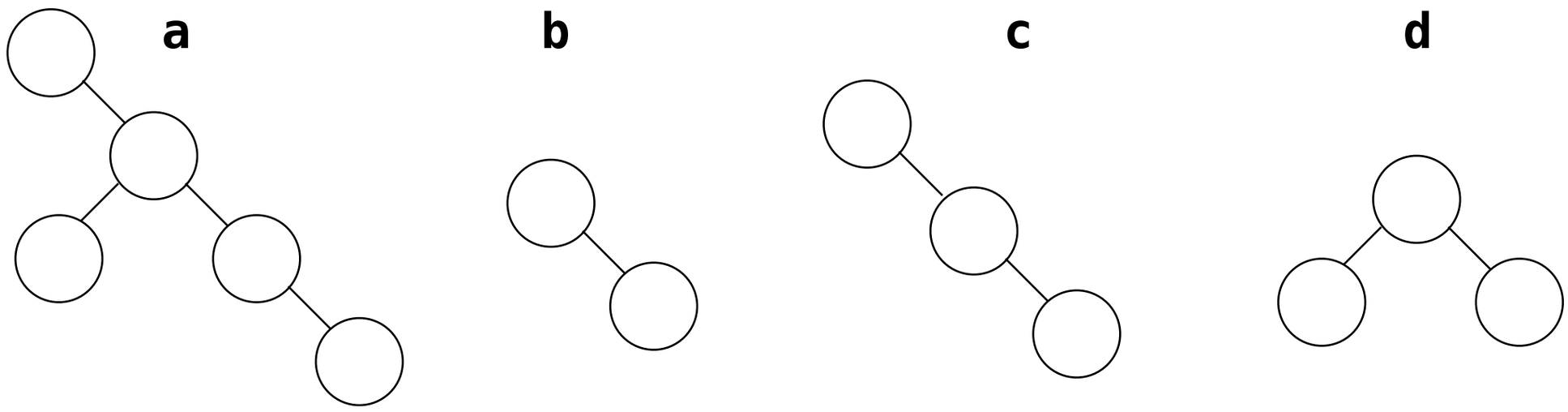


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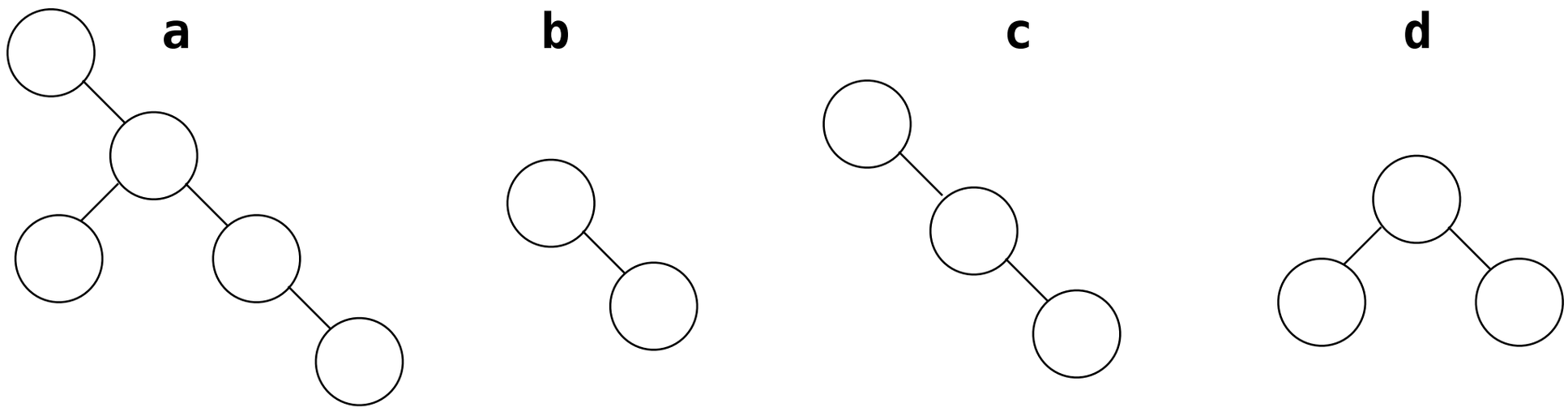


```
        Recursive call: both branches are pruned as well

         Base cases: one (or more) of the trees is None

def pruned(t1, t2):
    if t2 is None:
        return True
    if t1 is None:
        return False
    return pruned(t1.left, t2.left) and pruned(t1.right, t2.right)
```

Today's Topic: Handling Errors

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Sometimes, computers don't do exactly what we expect
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Grace Hopper's Notebook, 1947, Moth found in a Mark II Computer

Different Error Handling Policies

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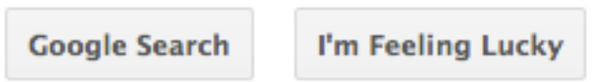
Versus

Different Error Handling Policies



Versus

```
Python 3.2 (r32:88452, Feb 20 2011, 11:12:31)
[GCC 4.2.1 (Apple Inc. build 5664)] on darwin
Type "copyright", "credits" or "license()" for more information.
>>> from math import sqrt
>>> for value in map(sqrt, [4 - x for x in range(10)]):
        print(value)


2.0
1.7320508075688772
1.4142135623730951
1.0
0.0
Traceback (most recent call last):
  File "<pyshell#3>", line 1, in <module>
    for value in map(sqrt, [4 - x for x in range(10)]):
ValueError: math domain error
```

Exceptions

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A built-in mechanism in a programming language to declare and respond to exceptional conditions

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However, exception handling tends to be slow.

Assert Statements

Assert statements raise an exception of type AssertionError

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RuntimeError -- Catch-all for troubles during interpretation

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WWPD: What Would Python Do?

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def invert(x):
    result = 1/x  # Raises a ZeroDivisionError if x is 0
    print('Never printed if x is 0')
    return result

def invert_safe(x):
    try:
        return invert(x)
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        return str(e)
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    def update(x):
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    """Return a guess of a zero of the function f, near guess.

    >>> from math import sin
    >>> find_root(lambda y: sin(y), 3)
    3.141592653589793
    """
    return iter_improve(newton_update(f), lambda x: f(x) == 0, guess)
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Exception Chaining

Bonus Material

The except suite of a try statement can raise another exception that adds additional information.

Demo