

Recursion Starter

An exploration

Ex #1

```
public void doSomething(int num)
{
    System.out.println(num);
    doSomething(num+1);
}
```

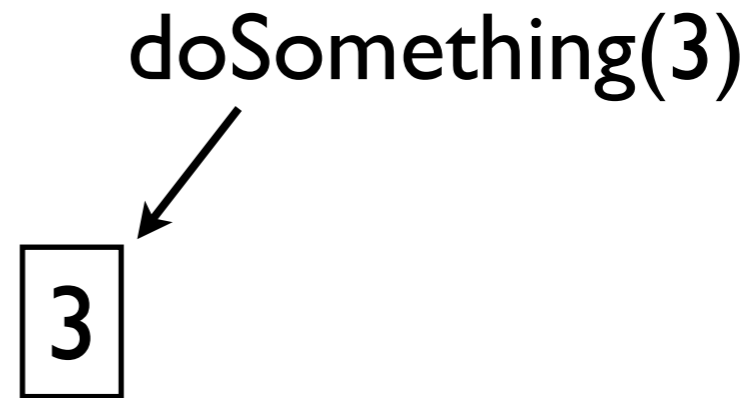
Ex #1

doSomething(3)

```
public void doSomething(int num)
{
    System.out.println(num);
    doSomething(num+1);
}
```

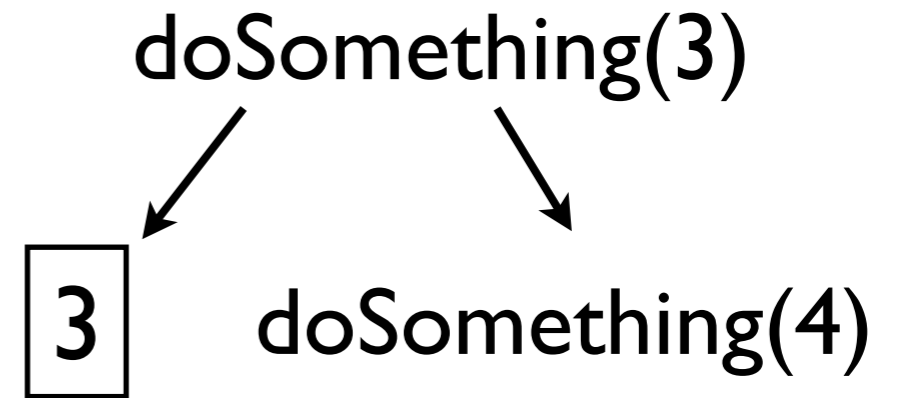
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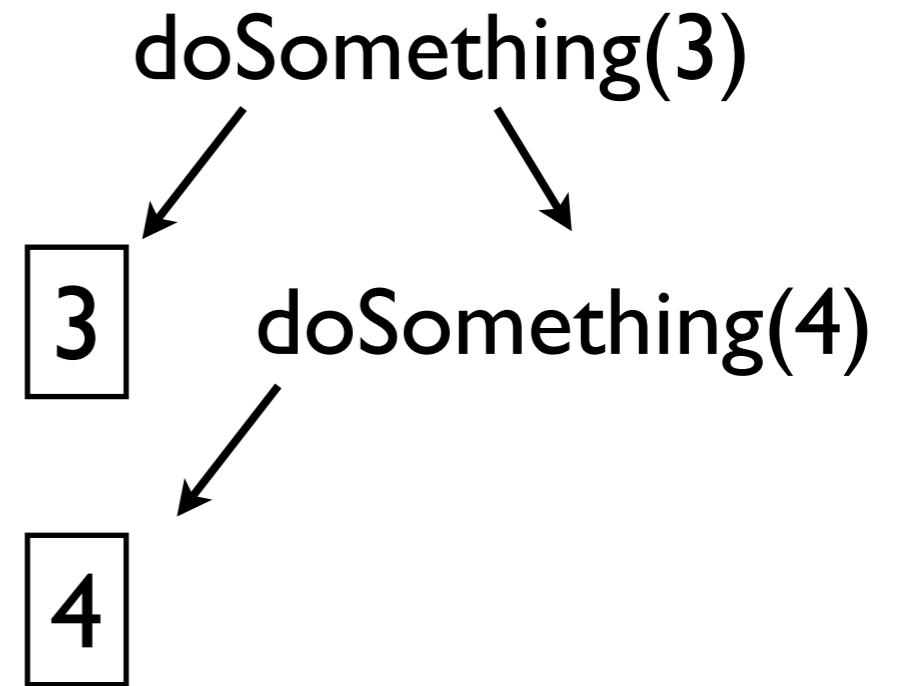
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}
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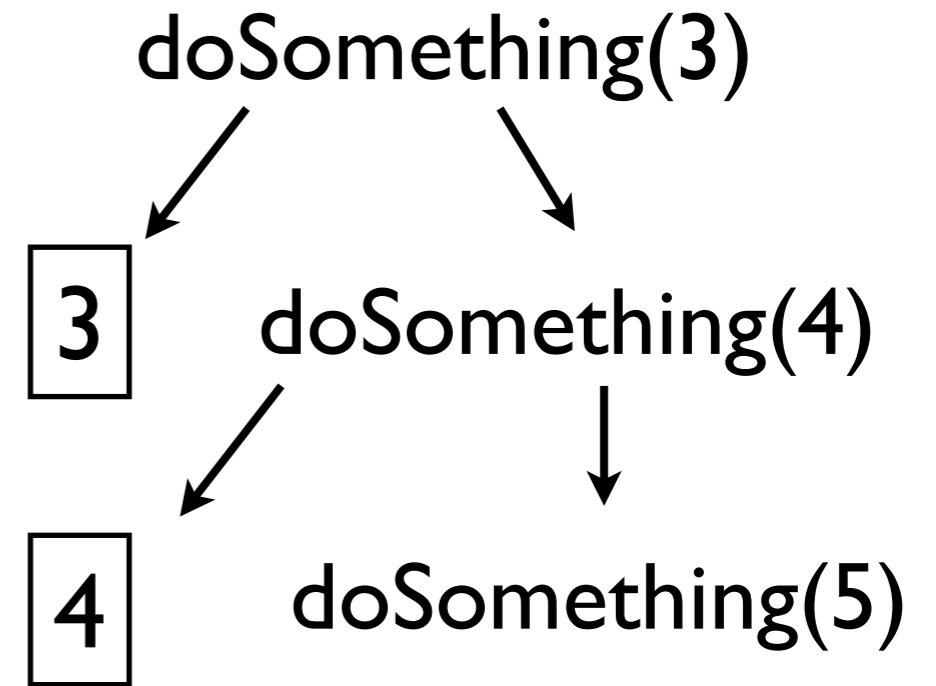
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}
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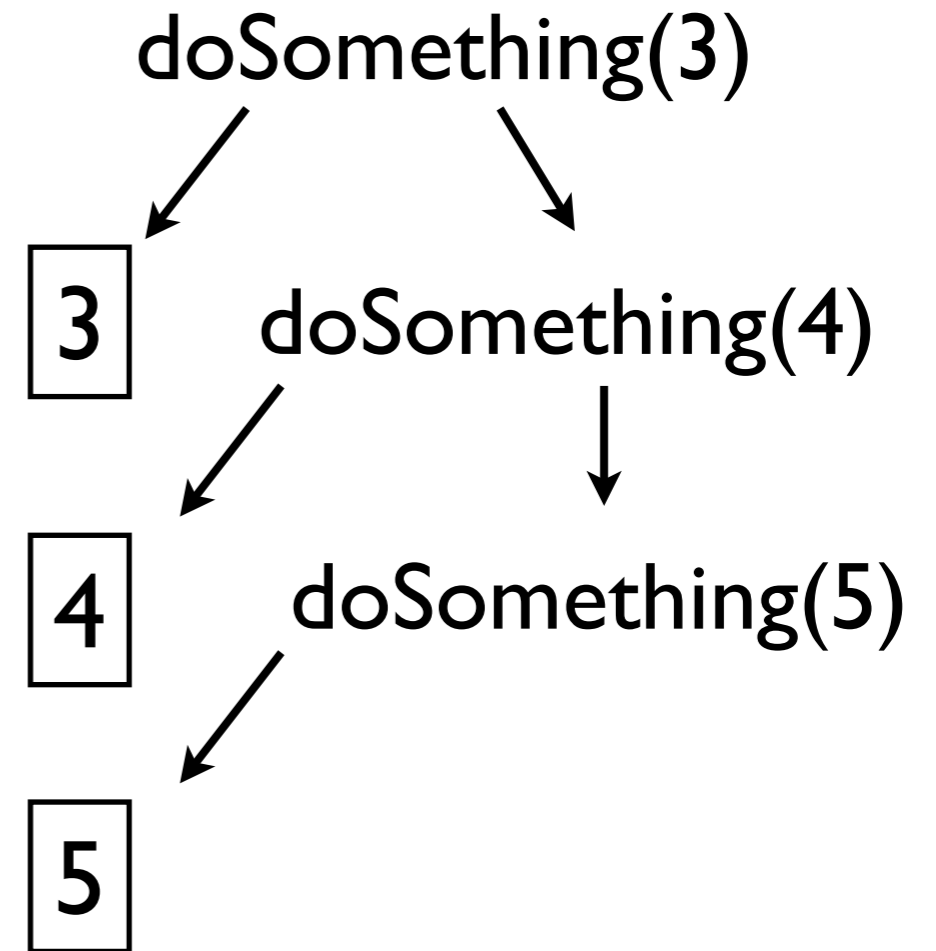
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}
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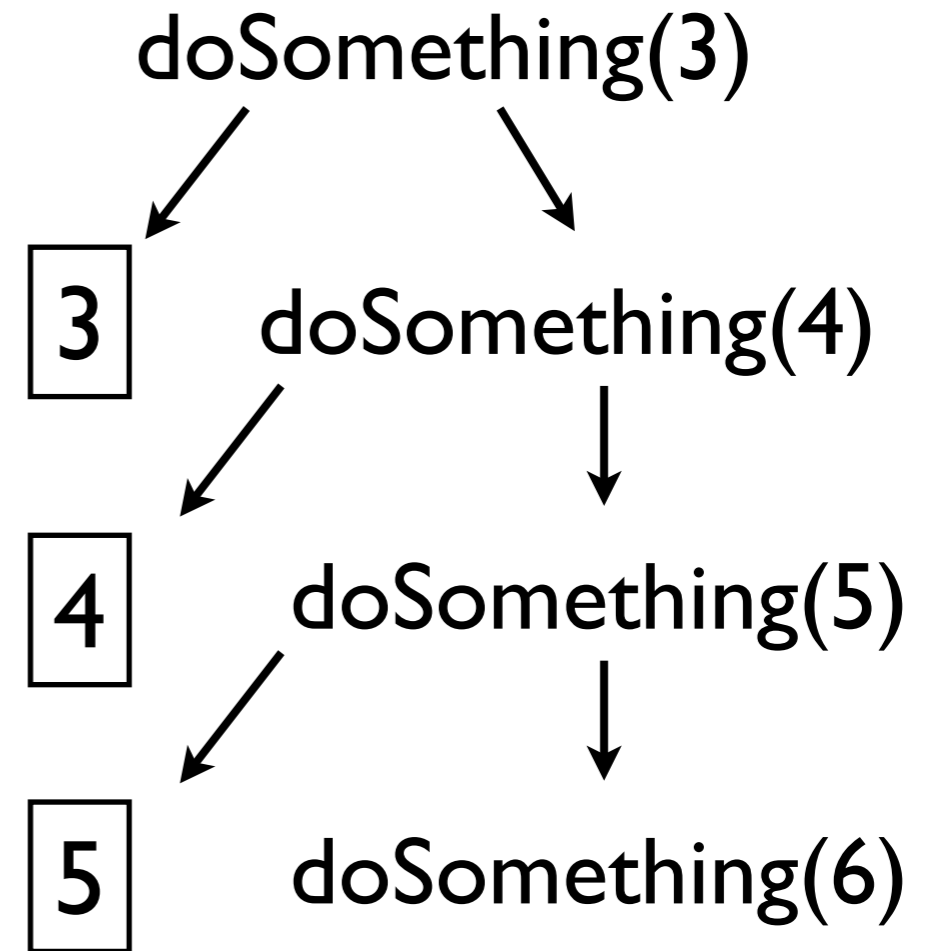
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    System.out.println(num);
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}
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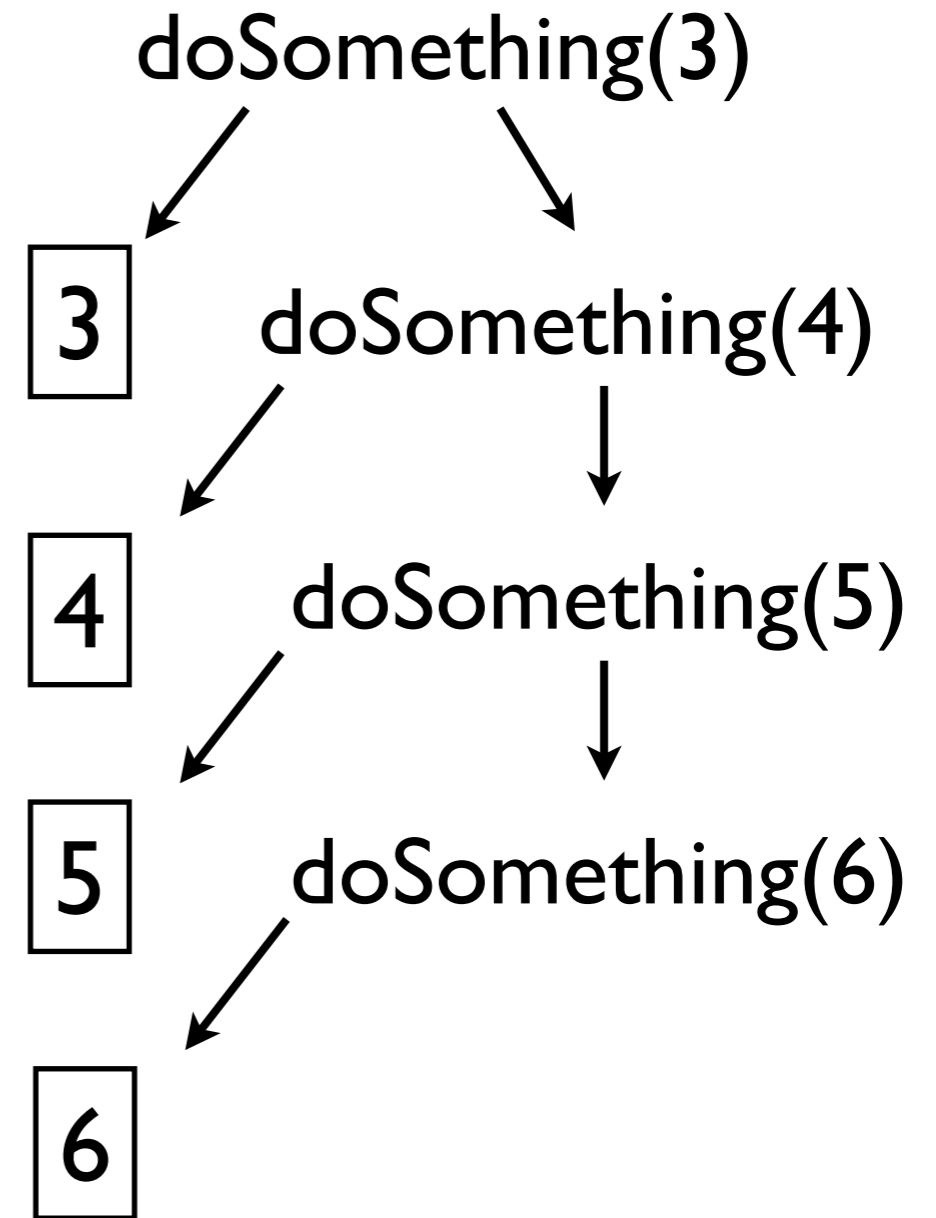
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}
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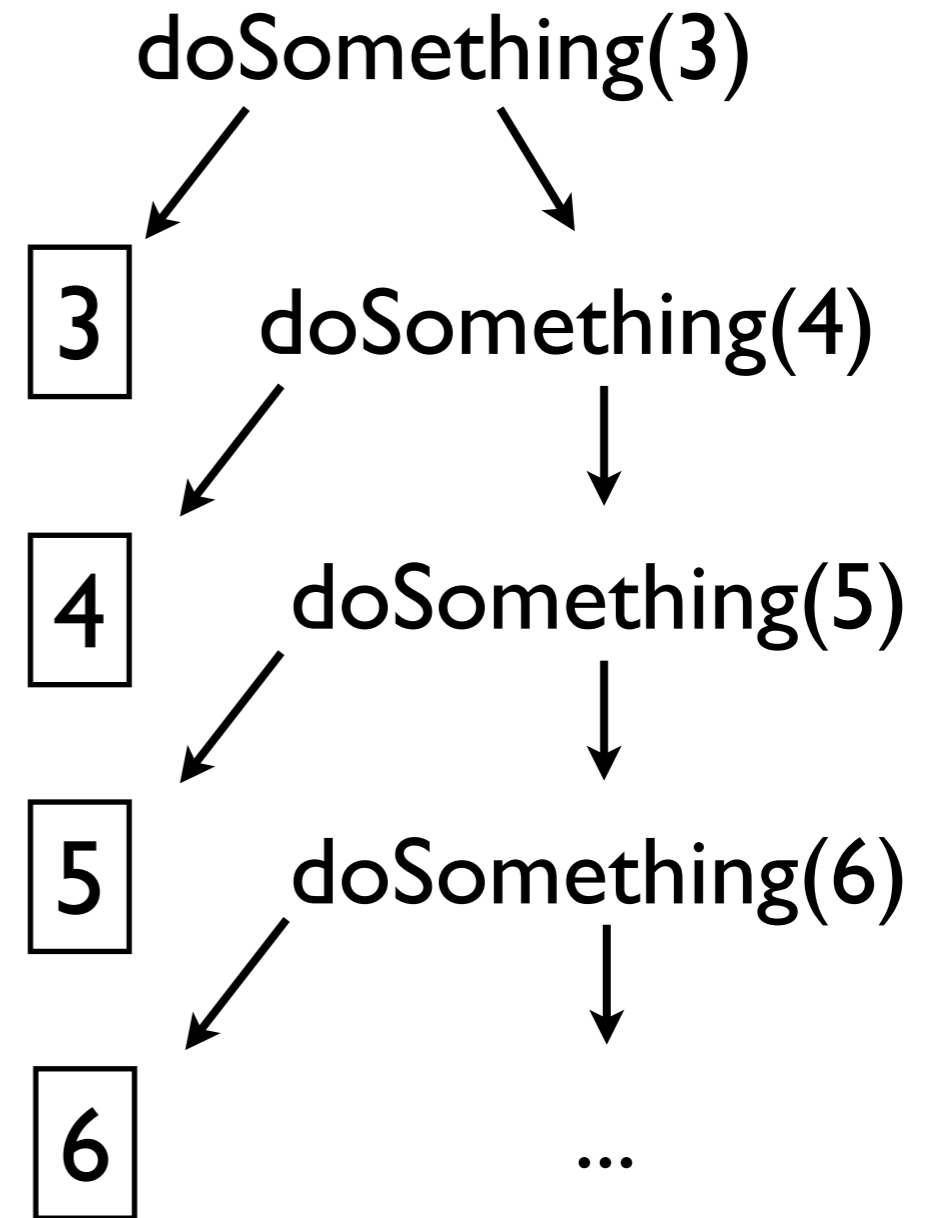
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public void doSomething(int num)
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    System.out.println(num);
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}
```



Ex #1

```
public void doSomething(int num)
{
    System.out.println(num);
    doSomething(num+1);
}
```



Ex #2

```
public void tryThis(int num)
{
    if(num < 5)
    {
        System.out.println(num);
        tryThis(num+1);
    }
}
```

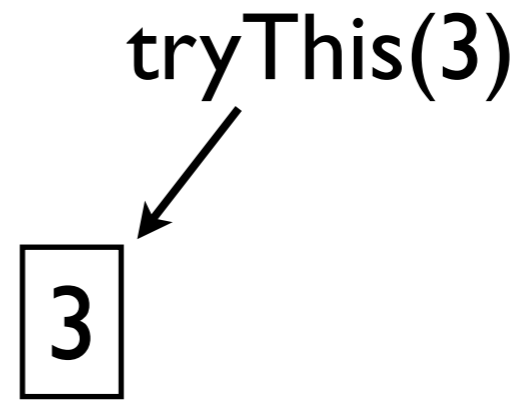
Ex #2

tryThis(3)

```
public void tryThis(int num)
{
    if(num < 5)
    {
        System.out.println(num);
        tryThis(num+1);
    }
}
```

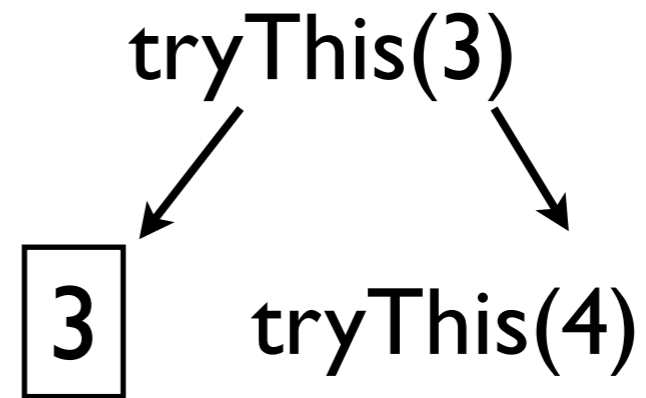
Ex #2

```
public void tryThis(int num)
{
    if(num < 5)
    {
        System.out.println(num);
        tryThis(num+1);
    }
}
```



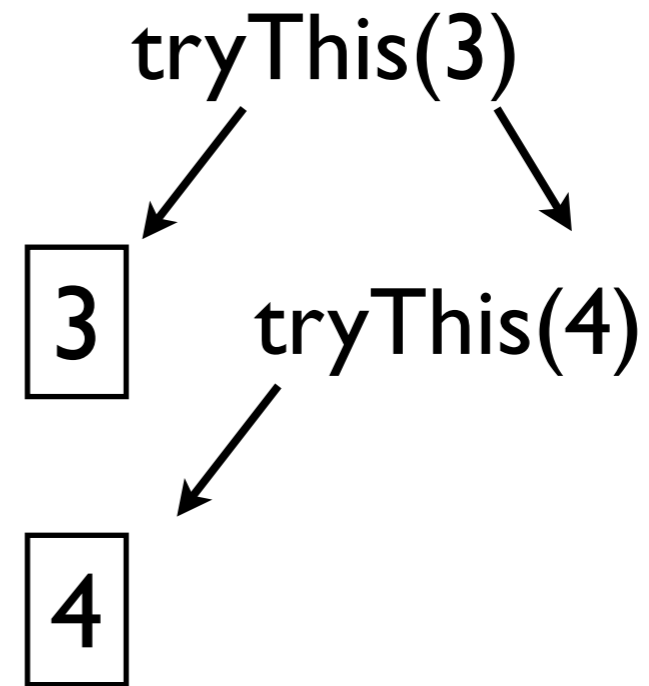
Ex #2

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{
    if(num < 5)
    {
        System.out.println(num);
        tryThis(num+1);
    }
}
```



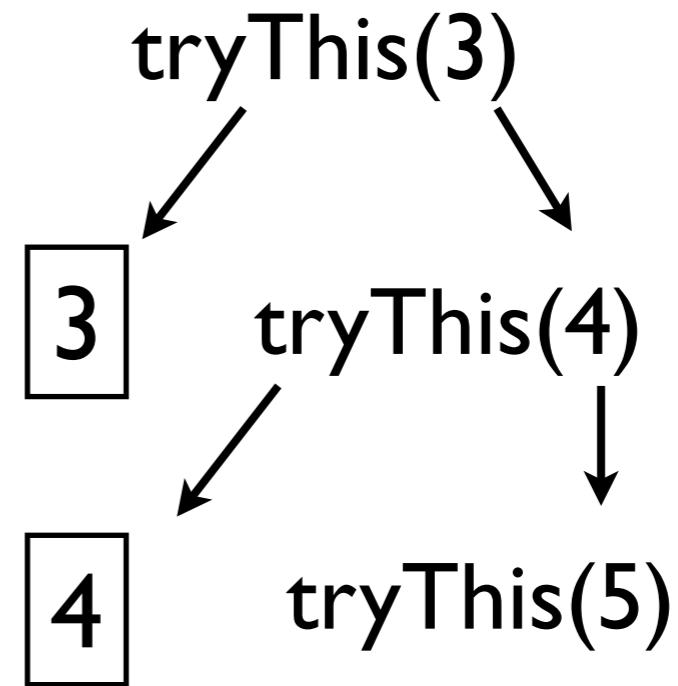
Ex #2

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    {
        System.out.println(num);
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    }
}
```



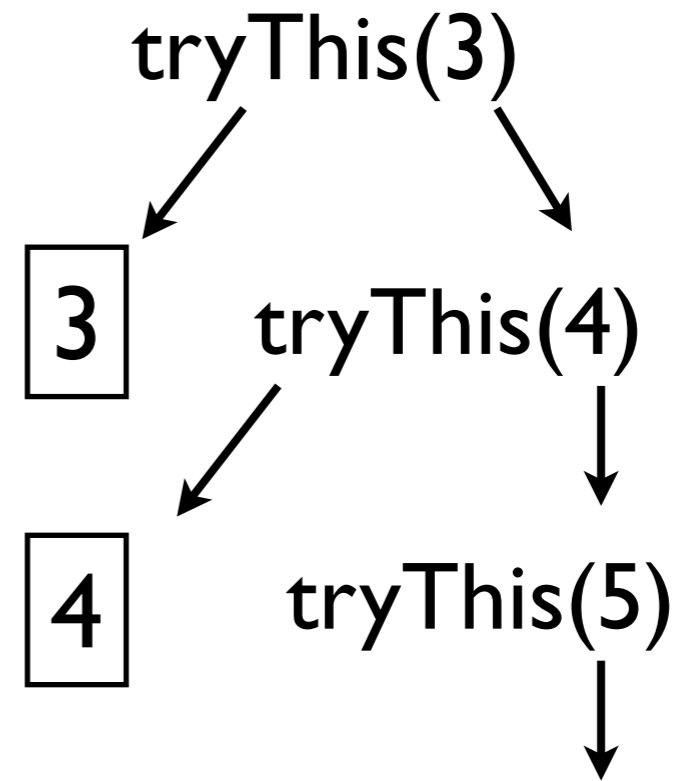
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public void tryThis(int num)
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    if(num < 5)
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        System.out.println(num);
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```



Ex #2

```
public void tryThis(int num)
{
    if(num < 5)
    {
        System.out.println(num);
        tryThis(num+1);
    }
}
```



Ex #3

```
public void doThis(int x)
{
    if(x == 0)
        System.out.println("Done");
    else
    {
        System.out.println(x);
        doThis(x-1);
    }
}
```

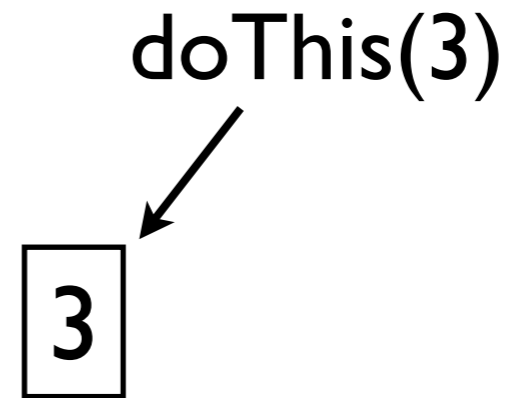
Ex #3

doThis(3)

```
public void doThis(int x)
{
    if(x == 0)
        System.out.println("Done");
    else
    {
        System.out.println(x);
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    }
}
```

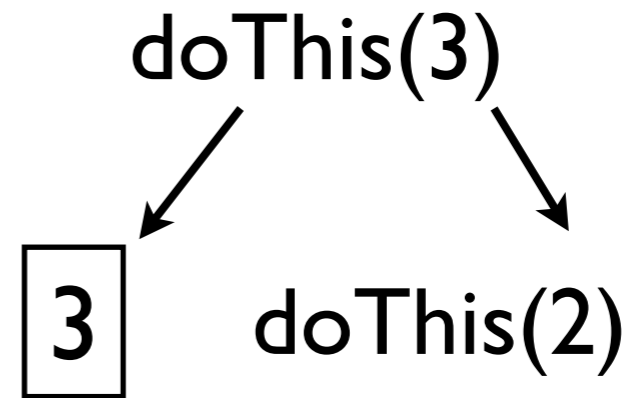
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public void doThis(int x)
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```



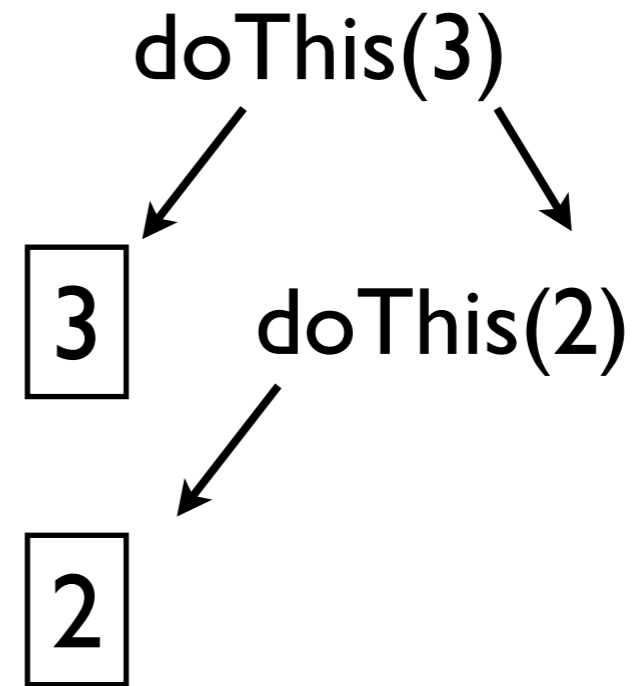
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public void doThis(int x)
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    if(x == 0)
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    {
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    }
}
```



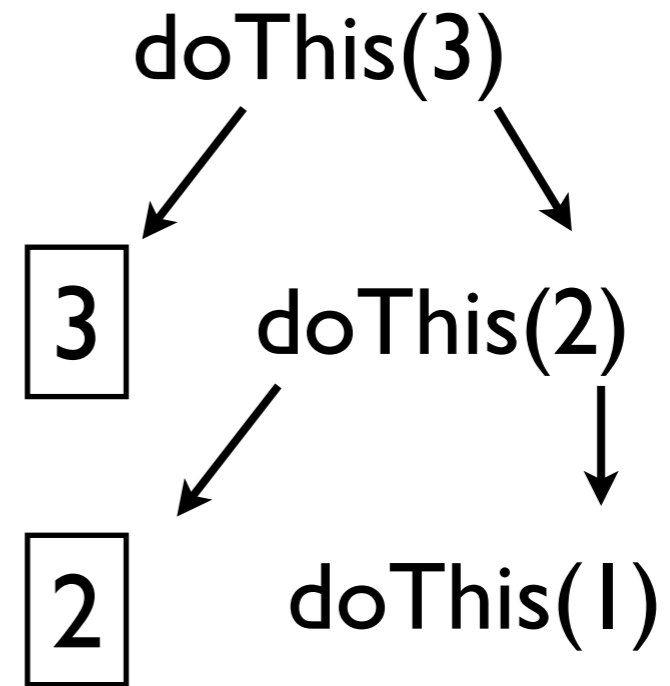
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```



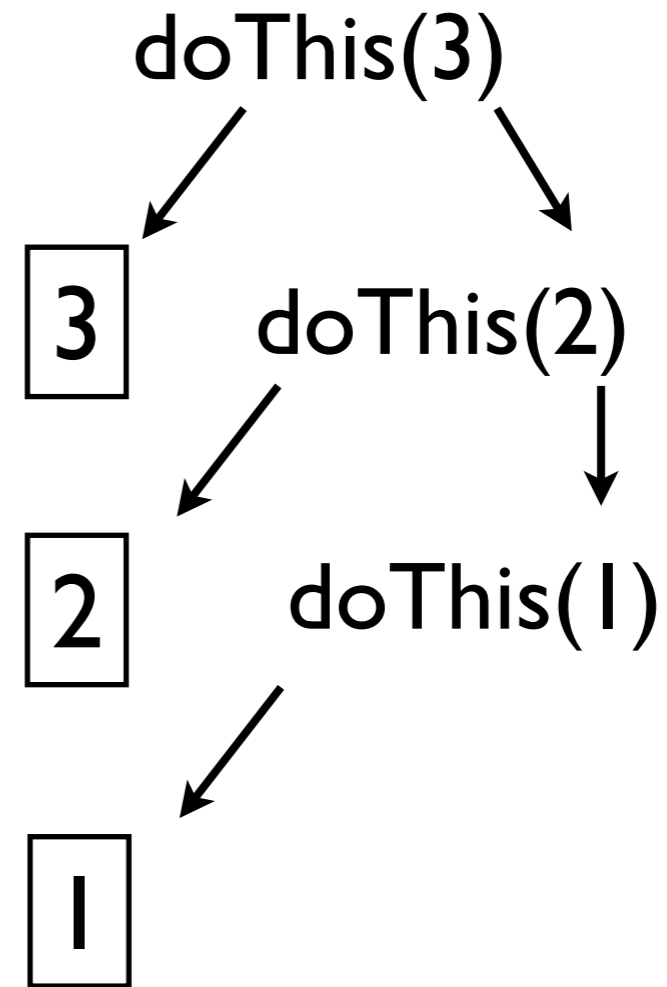
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    }
}
```



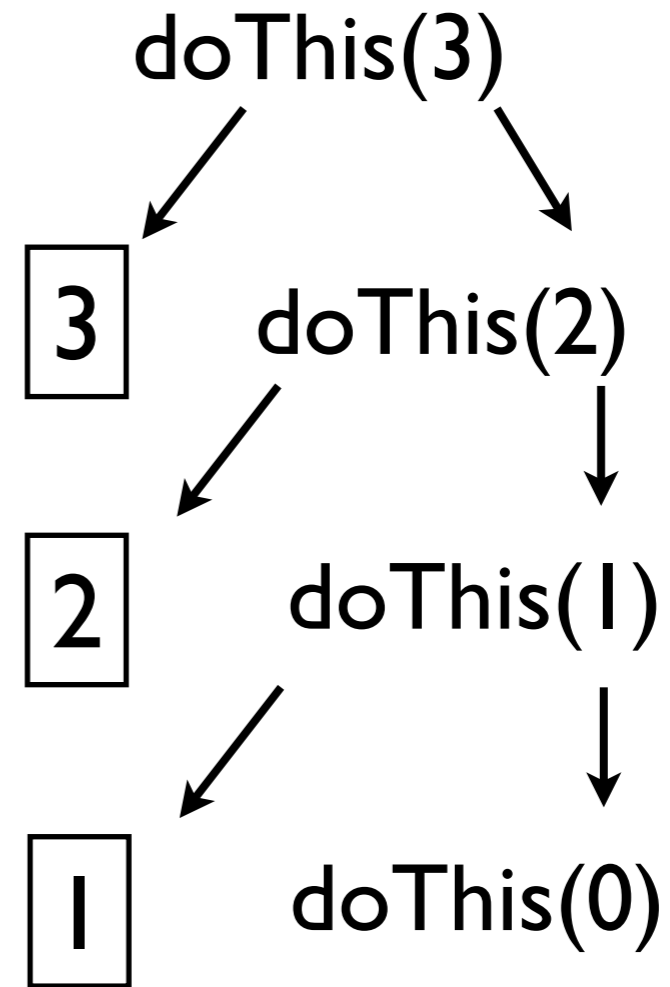
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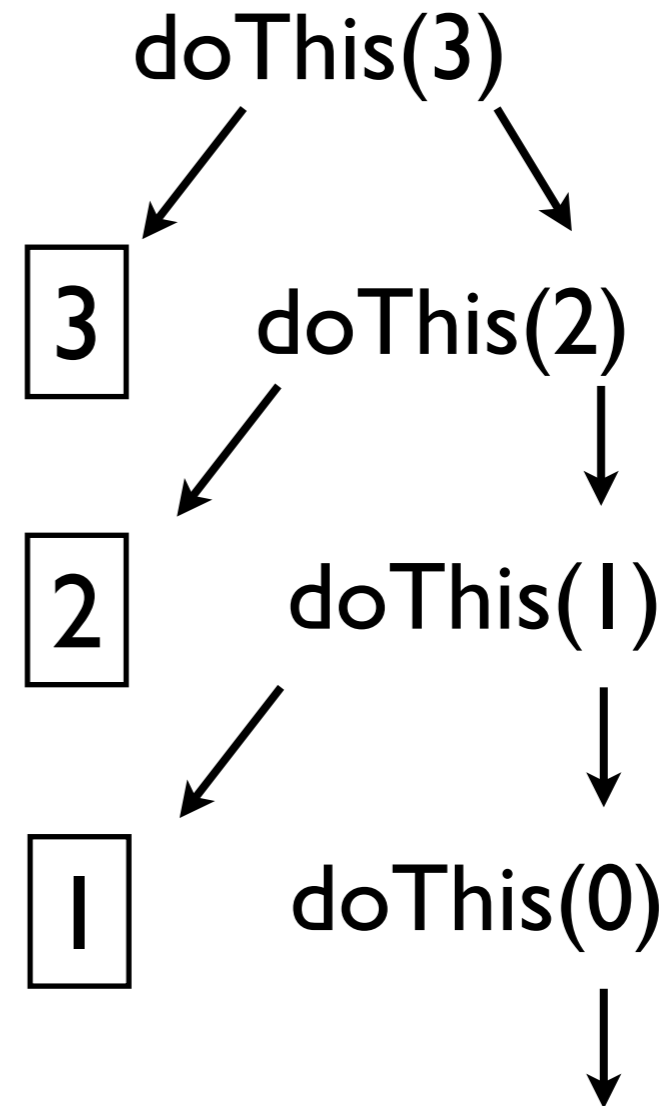
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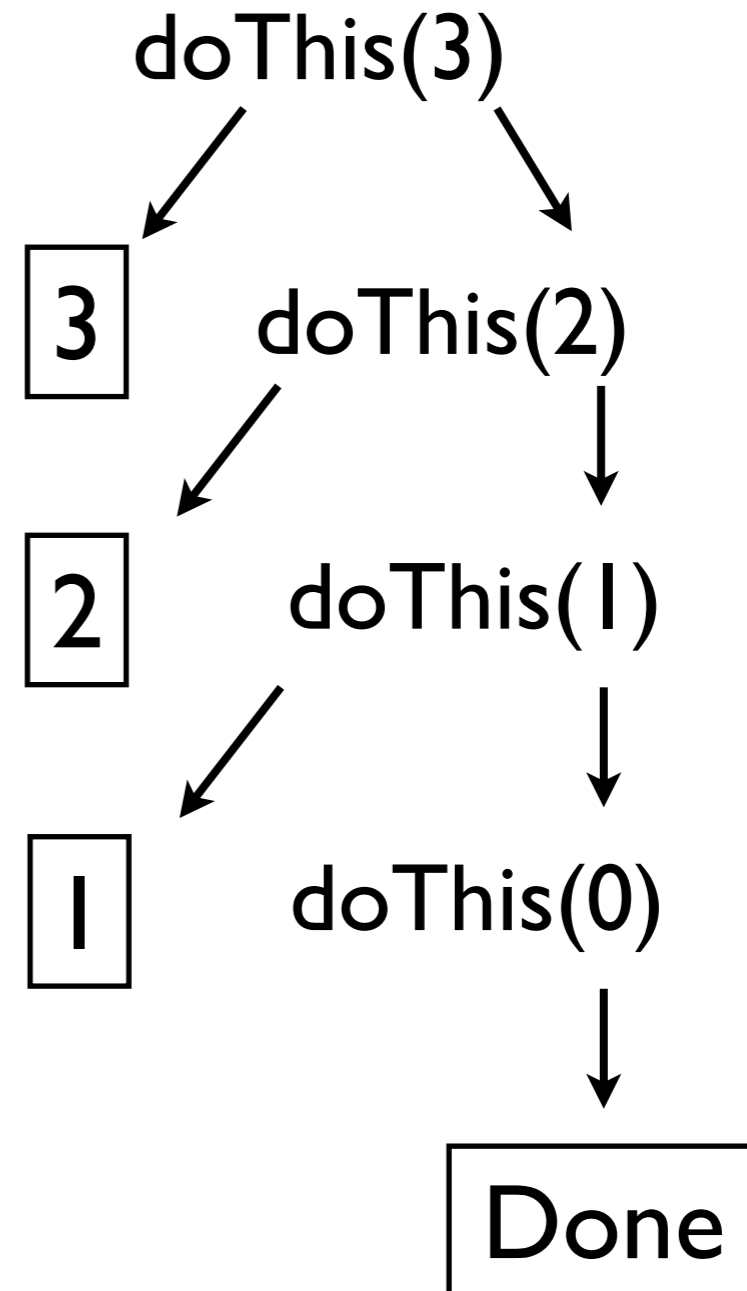
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Ex #4

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public void buildThis(int x)
{
    if(x == 0)
        System.out.print("Done");
    else
    {
        System.out.print(x);
        buildThis(x-1);
        System.out.print(x);
    }
}
```

Ex #4

buildThis(3)

```
public void buildThis(int x)
{
    if(x == 0)
        System.out.print("Done");
    else
    {
        System.out.print(x);
        buildThis(x-1);
        System.out.print(x);
    }
}
```

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public void buildThis(int x)
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    }
}
```

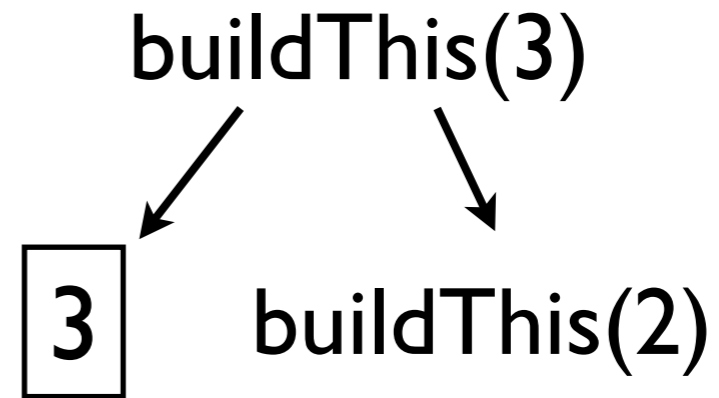
buildThis(3)



3

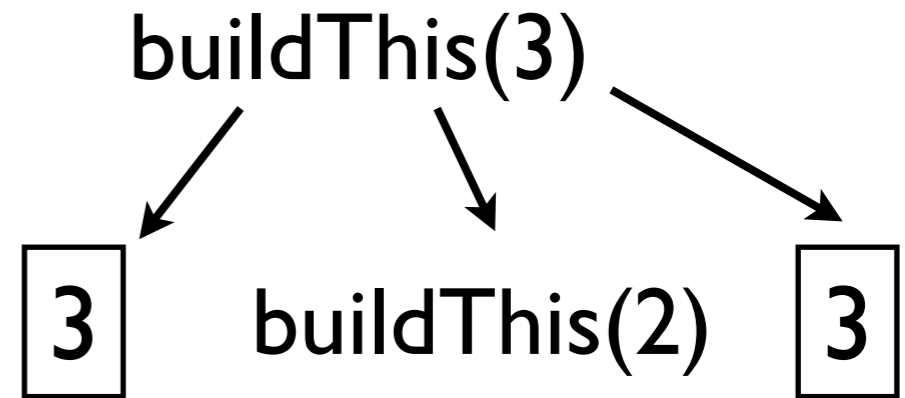
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public void buildThis(int x)
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    if(x == 0)
        System.out.print("Done");
    else
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        System.out.print(x);
        buildThis(x-1);
        System.out.print(x);
    }
}
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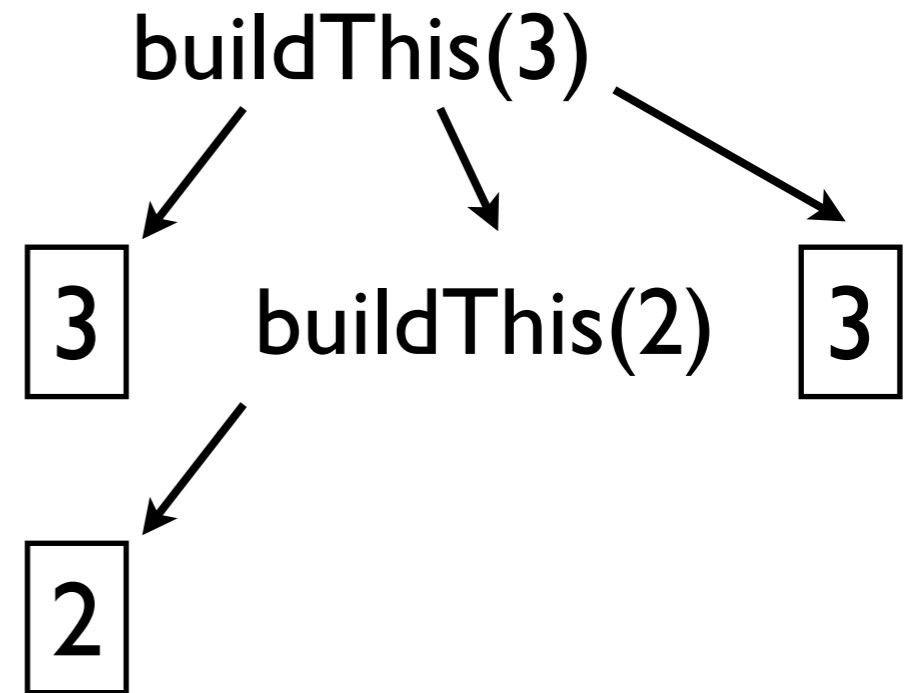
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        System.out.print(x);
    }
}
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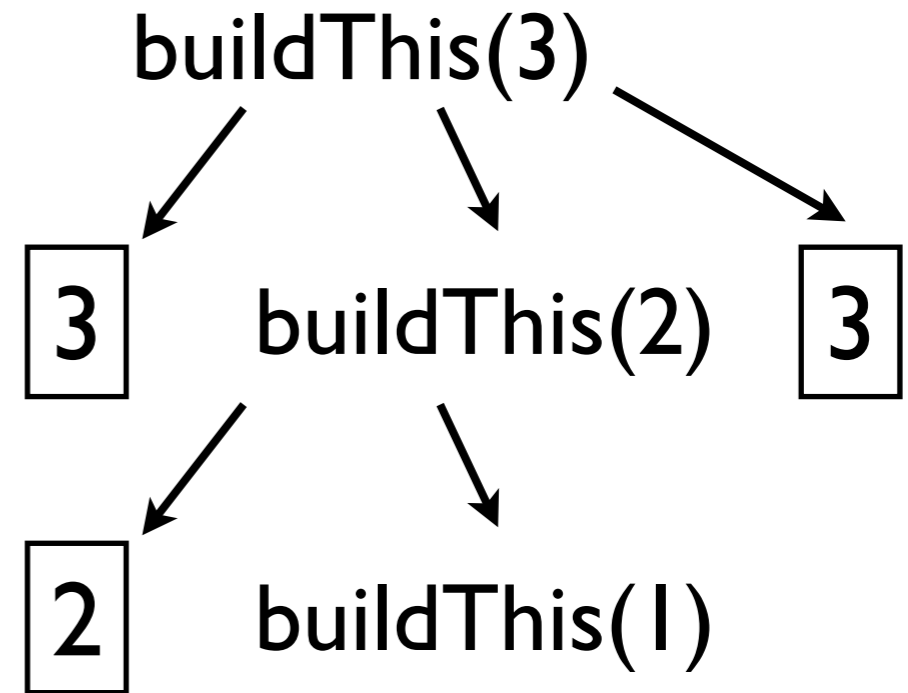
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    }
}
```



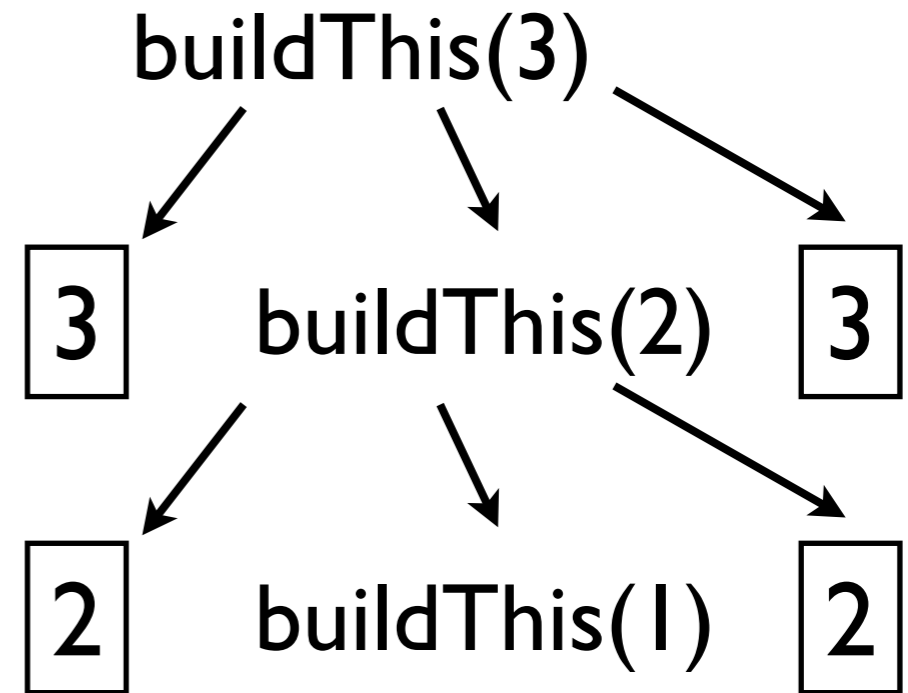
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    }
}
```



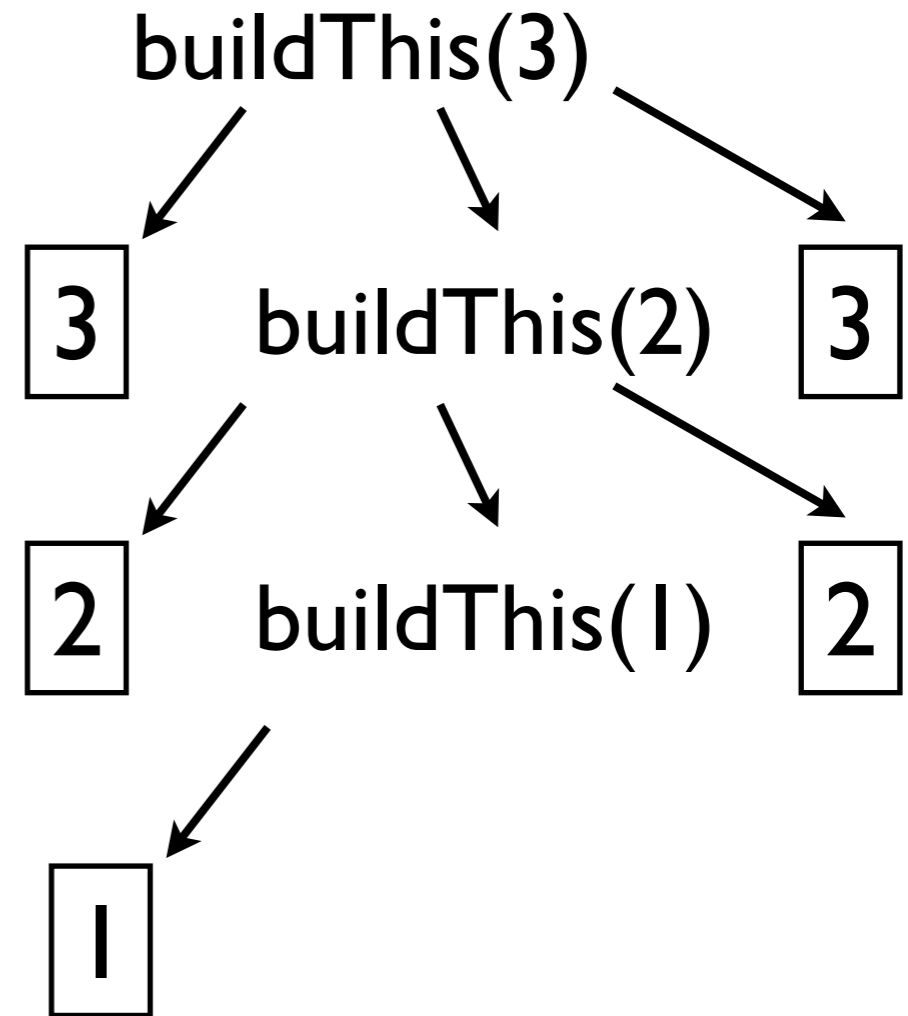
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    }
}
```



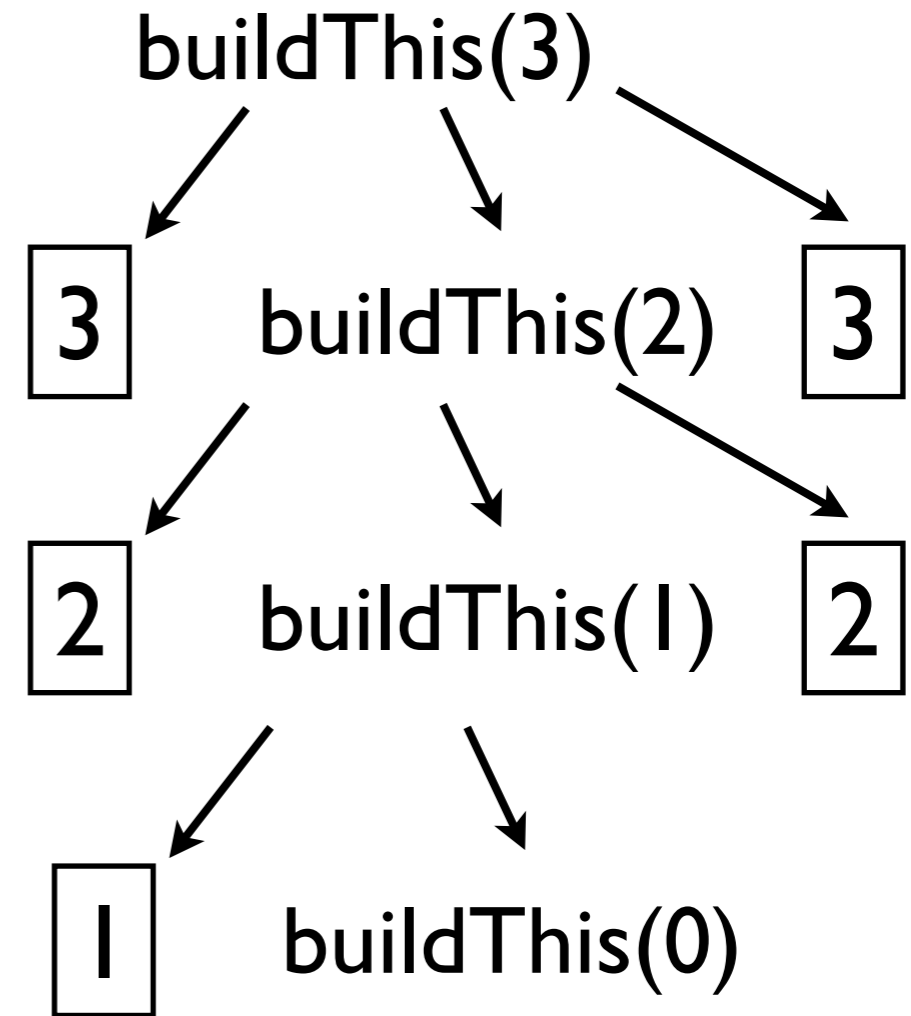
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        buildThis(x-1);
        System.out.print(x);
    }
}
```



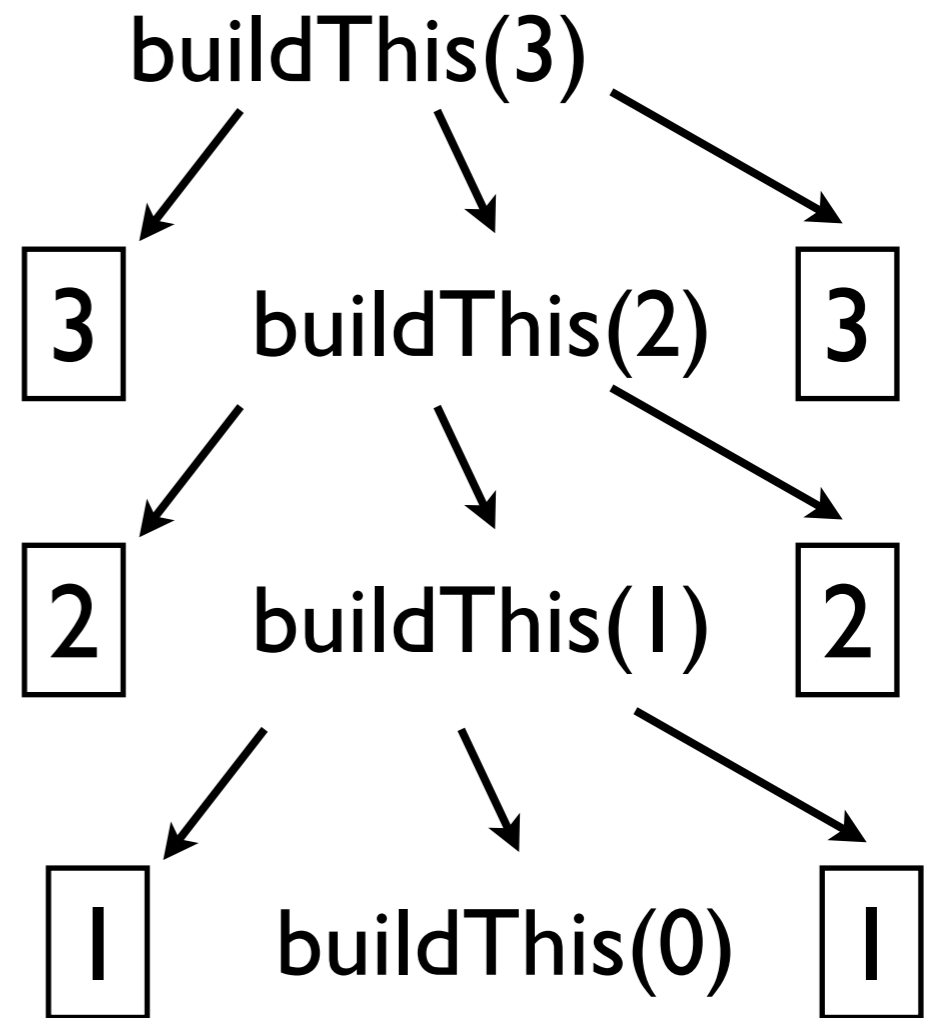
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    }
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```



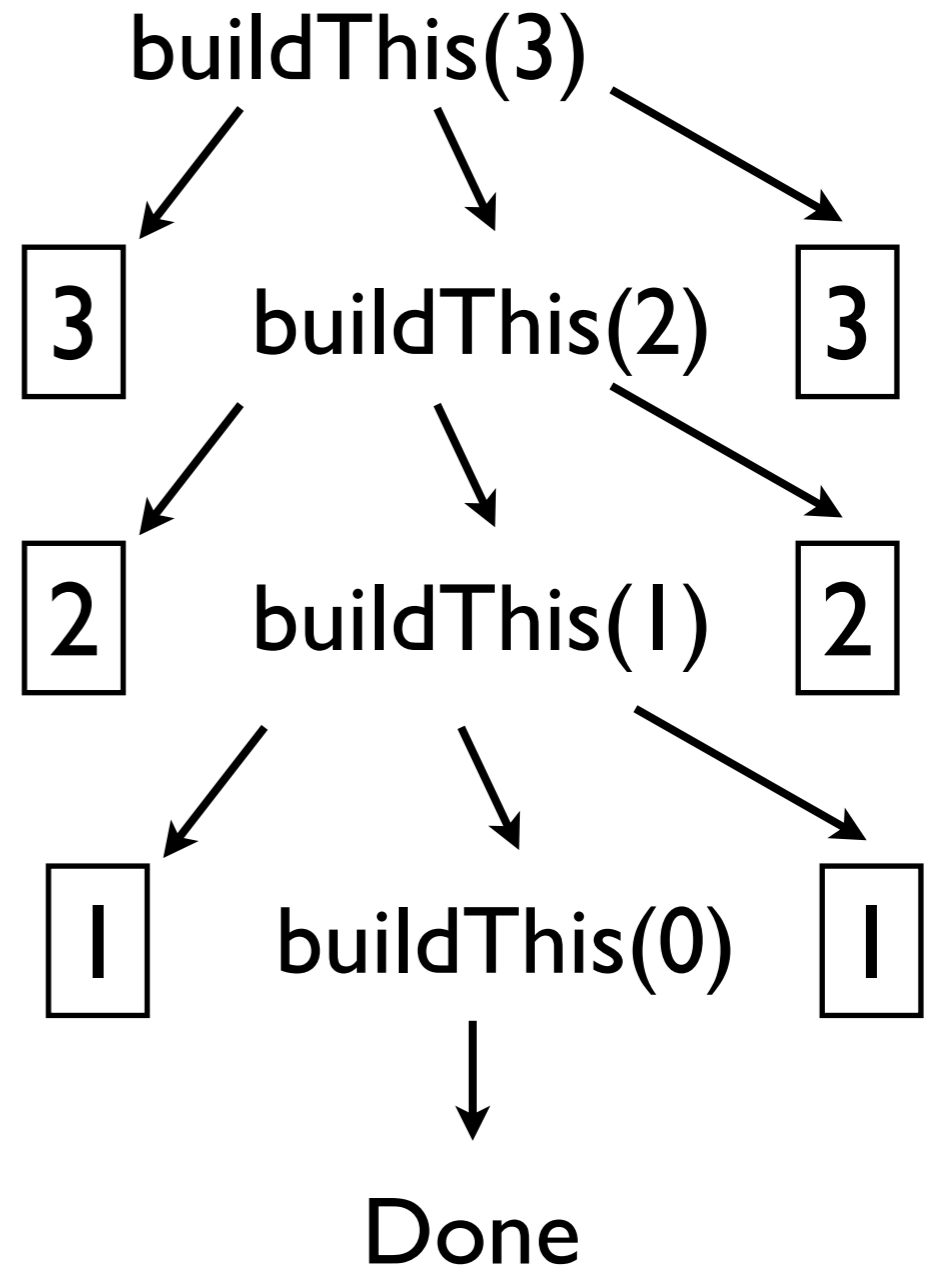
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    }
}
```



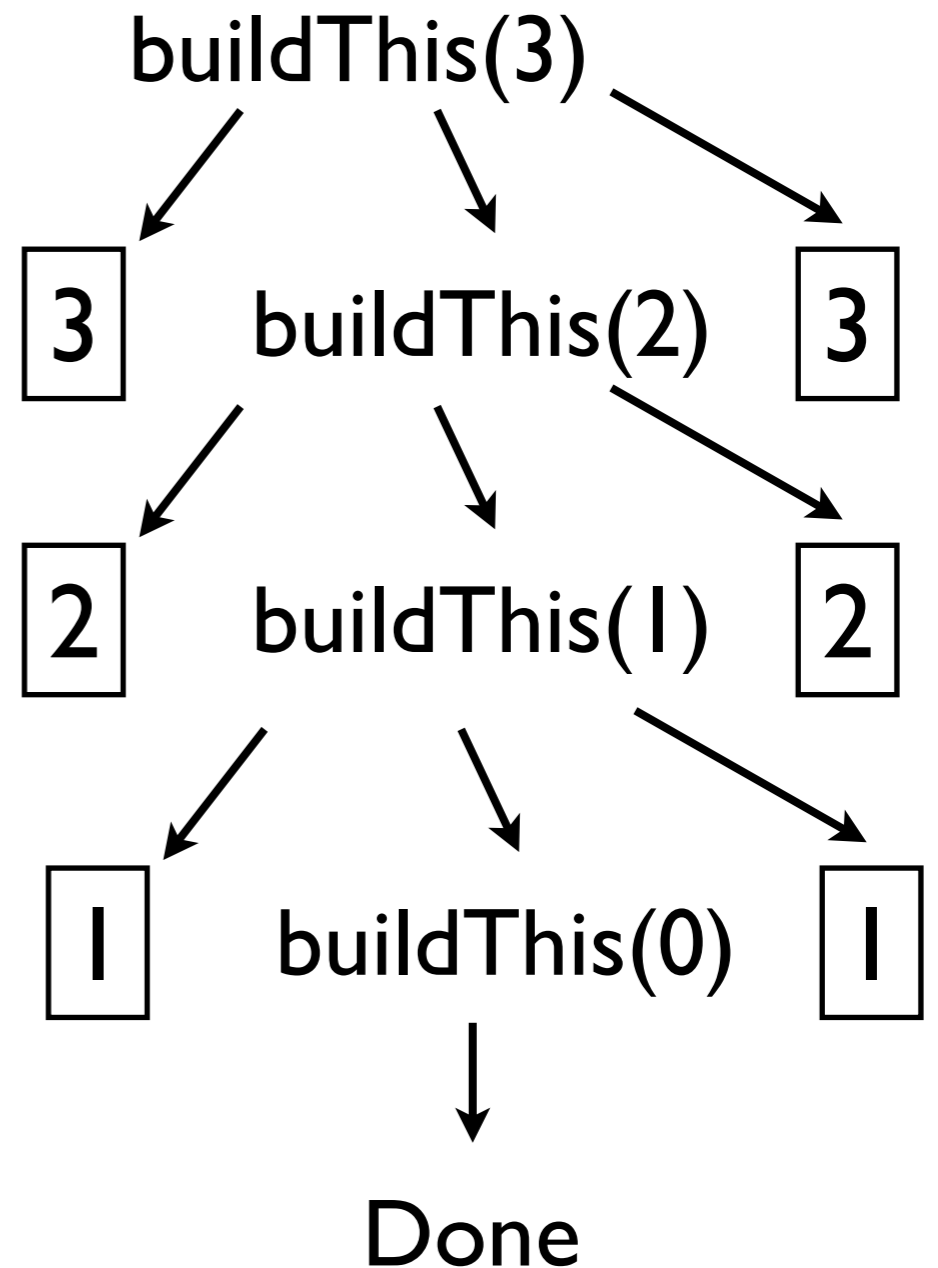
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    }
}
```



Ex #4

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public void buildThis(int x)
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    if(x == 0)
        System.out.print("Done");
    else
    {
        System.out.print(x);
        buildThis(x-1);
        System.out.print(x);
    }
}
```



321Done123

Ex #5 - backwards

```
public void goForIt(int x)
{
    if(x == 0)
        System.out.print("A");
    else
    {
        goForIt(x-1)
        System.out.print(x);
        goForIt(x-1);
    }
}
```

Ex #5 - backwards

goForIt(3) = ?

```
public void goForIt(int x)
{
    if(x == 0)
        System.out.print("A");
    else
    {
        goForIt(x-1)
        System.out.print(x);
        goForIt(x-1);
    }
}
```

Ex #5 - backwards

goForIt(3) = ?

goForIt(0) = A

```
public void goForIt(int x)
{
    if(x == 0)
        System.out.print("A");
    else
    {
        goForIt(x-1)
        System.out.print(x);
        goForIt(x-1);
    }
}
```

Ex #5 - backwards

```
public void goForIt(int x)
{
    if(x == 0)
        System.out.print("A");
    else
    {
        goForIt(x-1)
        System.out.print(x);
        goForIt(x-1);
    }
}
```

goForIt(3) = ?

goForIt(0) = A

goForIt(1) =

Ex #5 - backwards

```
public void goForIt(int x)
{
    if(x == 0)
        System.out.print("A");
    else
    {
        goForIt(x-1)
        System.out.print(x);
        goForIt(x-1);
    }
}
```

goForIt(3) = ?

goForIt(0) = A

goForIt(1) =
goForIt(0) + 1 + goForIt(0) =

Ex #5 - backwards

```
public void goForIt(int x)
{
    if(x == 0)
        System.out.print("A");
    else
    {
        goForIt(x-1)
        System.out.print(x);
        goForIt(x-1);
    }
}
```

goForIt(3) = ?

goForIt(0) = A

goForIt(1) =
goForIt(0) + 1 + goForIt(0) =
A1A

Ex #5 - backwards

```
public void goForIt(int x)
{
    if(x == 0)
        System.out.print("A");
    else
    {
        goForIt(x-1)
        System.out.print(x);
        goForIt(x-1);
    }
}
```

goForIt(3) = ?

goForIt(0) = A

goForIt(1) =

goForIt(0) + 1 + goForIt(0) =
A1A

goForIt(2) =

Ex #5 - backwards

```
public void goForIt(int x)
{
    if(x == 0)
        System.out.print("A");
    else
    {
        goForIt(x-1)
        System.out.print(x);
        goForIt(x-1);
    }
}
```

goForIt(3) = ?

goForIt(0) = A

goForIt(1) =
goForIt(0) + 1 + goForIt(0) =
A1A

goForIt(2) =
goForIt(1) + 2 + goForIt(1) =

Ex #5 - backwards

```
public void goForIt(int x)
{
    if(x == 0)
        System.out.print("A");
    else
    {
        goForIt(x-1)
        System.out.print(x);
        goForIt(x-1);
    }
}
```

goForIt(3) = ?

goForIt(0) = A

goForIt(1) =
goForIt(0) + 1 + goForIt(0) =
A1A

goForIt(2) =
goForIt(1) + 2 + goForIt(1) =
A1A2A1A

Ex #5 - backwards

```
public void goForIt(int x)
{
    if(x == 0)
        System.out.print("A");
    else
    {
        goForIt(x-1)
        System.out.print(x);
        goForIt(x-1);
    }
}
```

goForIt(3) = ?

goForIt(0) = A

goForIt(1) =
goForIt(0) + 1 + goForIt(0) =
A1A

goForIt(2) =
goForIt(1) + 2 + goForIt(1) =
A1A2A1A

goForIt(3) =

Ex #5 - backwards

```
public void goForIt(int x)
{
    if(x == 0)
        System.out.print("A");
    else
    {
        goForIt(x-1)
        System.out.print(x);
        goForIt(x-1);
    }
}
```

goForIt(3) = ?

goForIt(0) = A

goForIt(1) =
goForIt(0) + 1 + goForIt(0) =
A1A

goForIt(2) =
goForIt(1) + 2 + goForIt(1) =
A1A2A1A

goForIt(3) =
goForIt(2) + 3 + goForIt(2) =

Ex #5 - backwards

```
public void goForIt(int x)
{
    if(x == 0)
        System.out.print("A");
    else
    {
        goForIt(x-1)
        System.out.print(x);
        goForIt(x-1);
    }
}
```

goForIt(3) = ?

goForIt(0) = A

goForIt(1) =
goForIt(0) + 1 + goForIt(0) =
A1A

goForIt(2) =
goForIt(1) + 2 + goForIt(1) =
A1A2A1A

goForIt(3) =
goForIt(2) + 3 + goForIt(2) =
A1A2A1A3A1A2A1A

Ex #6

```
public int runIt(int x)
{
    if(x == 1)
        return 1;
    else
        return runIt(x-1) + x;
}
```

Ex #6

runIt(4) = ?

```
public int runIt(int x)
{
    if(x == 1)
        return 1;
    else
        return runIt(x-1) + x;
}
```

Ex #6

runIt(4) = ?

runIt(1) = 1

```
public int runIt(int x)
{
    if(x == 1)
        return 1;
    else
        return runIt(x-1) + x;
}
```

Ex #6

runIt(4) = ?

runIt(1) = 1

runIt(2) =

```
public int runIt(int x)
{
    if(x == 1)
        return 1;
    else
        return runIt(x-1) + x;
}
```

Ex #6

runIt(4) = ?

runIt(1) = 1

runIt(2) =
runIt(1) + 2 =

```
public int runIt(int x)
{
    if(x == 1)
        return 1;
    else
        return runIt(x-1) + x;
}
```

Ex #6

runIt(4) = ?

runIt(1) = **1**

runIt(2) =
runIt(1) + 2 =
1 + 2 = 3

```
public int runIt(int x)
{
    if(x == 1)
        return 1;
    else
        return runIt(x-1) + x;
}
```

Ex #6

```
public int runIt(int x)
{
    if(x == 1)
        return 1;
    else
        return runIt(x-1) + x;
}
```

runIt(4) = ?

runIt(1) = **1**

runIt(2) =

runIt(1) + 2 =

1 + 2 = 3

runIt(3) =

Ex #6

```
public int runIt(int x)
{
    if(x == 1)
        return 1;
    else
        return runIt(x-1) + x;
}
```

runIt(4) = ?

runIt(1) = **1**

runIt(2) =
runIt(1) + 2 =
1 + 2 = **3**

runIt(3) =
runIt(2) + 3 =

Ex #6

```
public int runIt(int x)
{
    if(x == 1)
        return 1;
    else
        return runIt(x-1) + x;
}
```

runIt(4) = ?

runIt(1) = **1**

runIt(2) =
runIt(1) + 2 =
1 + 2 = **3**

runIt(3) =
runIt(2) + 3 =
3 + 3 = **6**

Ex #6

```
public int runIt(int x)
{
    if(x == 1)
        return 1;
    else
        return runIt(x-1) + x;
}
```

runIt(4) = ?

runIt(1) = **1**

runIt(2) =
runIt(1) + 2 =
1 + 2 = **3**

runIt(3) =
runIt(2) + 3 =
3 + 3 = **6**

runIt(4) =

Ex #6

```
public int runIt(int x)
{
    if(x == 1)
        return 1;
    else
        return runIt(x-1) + x;
}
```

runIt(4) = ?

runIt(1) = **1**

runIt(2) =
runIt(1) + 2 =
1 + 2 = **3**

runIt(3) =
runIt(2) + 3 =
3 + 3 = **6**

runIt(4) =
runIt(3) + 4 =

Ex #6

```
public int runIt(int x)
{
    if(x == 1)
        return 1;
    else
        return runIt(x-1) + x;
}
```

runIt(4) = ?

runIt(1) = **1**

runIt(2) =
runIt(1) + 2 =
1 + 2 = **3**

runIt(3) =
runIt(2) + 3 =
3 + 3 = **6**

runIt(4) =
runIt(3) + 4 =
6 + 4 = **10**

Ex #7

```
public int switchIt(int x, int y)
{
    if(x <= 1 || y <= 1)
        return 1;
    else
        return switchIt(y, x-1) + x*y;
}
```

Ex #7

switchIt(3,4)

```
public int switchIt(int x, int y)
{
    if(x <= 1 || y <= 1)
        return 1;
    else
        return switchIt(y, x-1) + x*y;
}
```

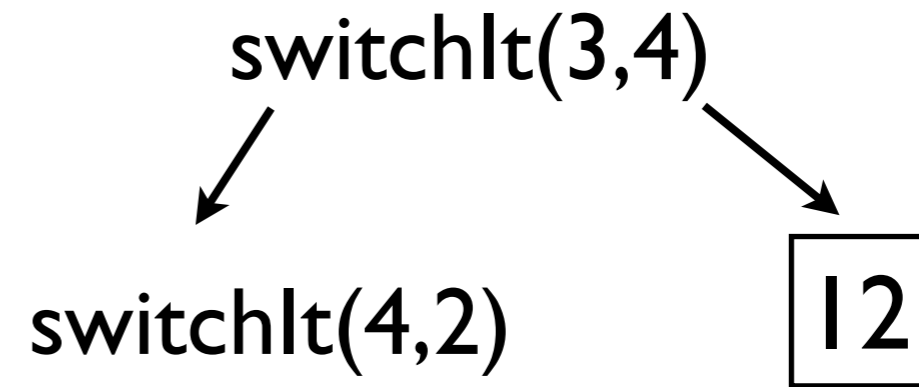
Ex #7

```
public int switchIt(int x, int y)
{
    if(x <= 1 || y <= 1)
        return 1;
    else
        return switchIt(y, x-1) + x*y;
}
```

switchIt(3,4)
↓
switchIt(4,2)

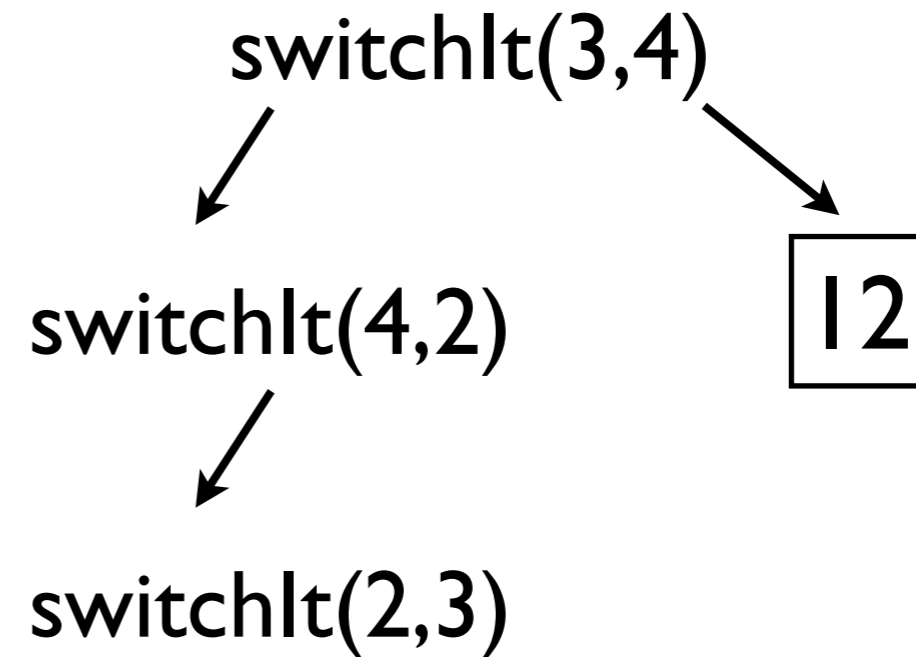
Ex #7

```
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{
    if(x <= 1 || y <= 1)
        return 1;
    else
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}
```



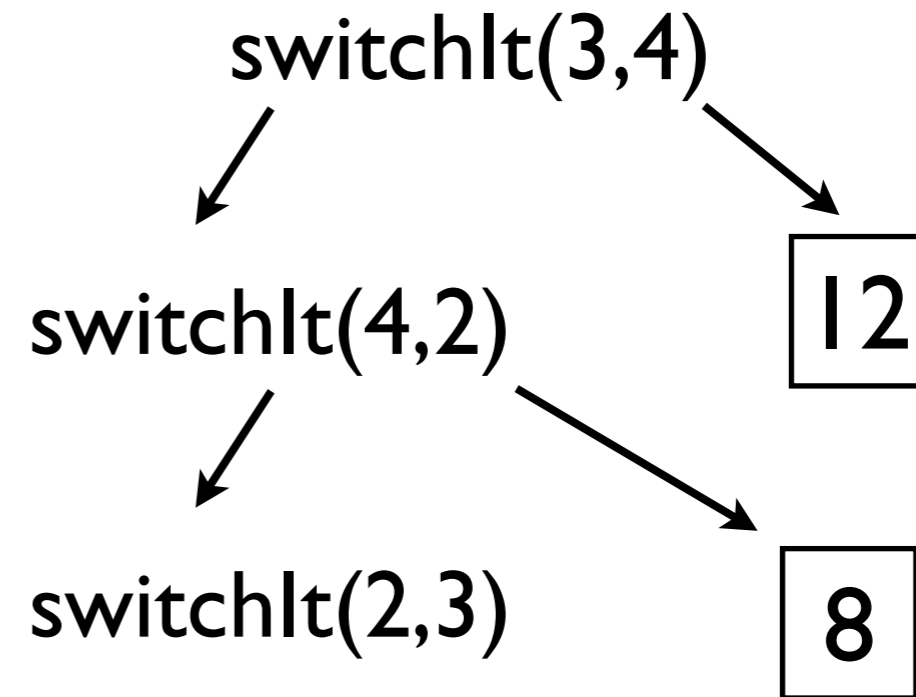
Ex #7

```
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    if(x <= 1 || y <= 1)
        return 1;
    else
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}
```



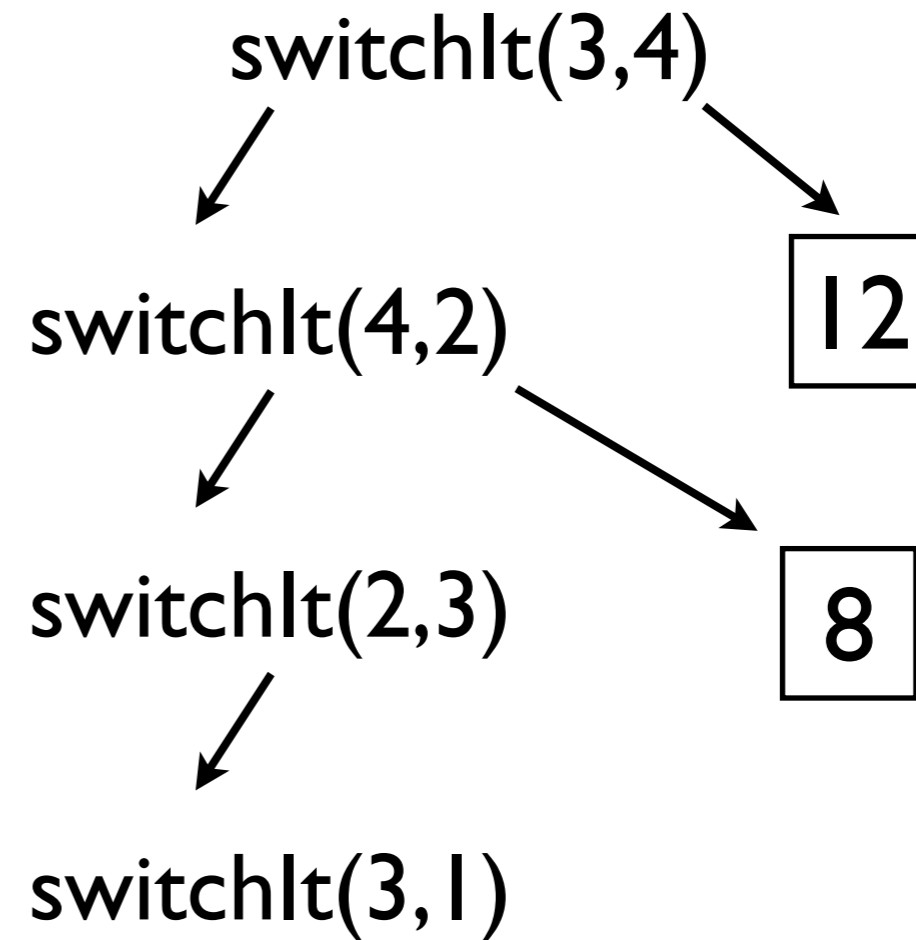
Ex #7

```
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    if(x <= 1 || y <= 1)
        return 1;
    else
        return switchIt(y, x-1) + x*y;
}
```



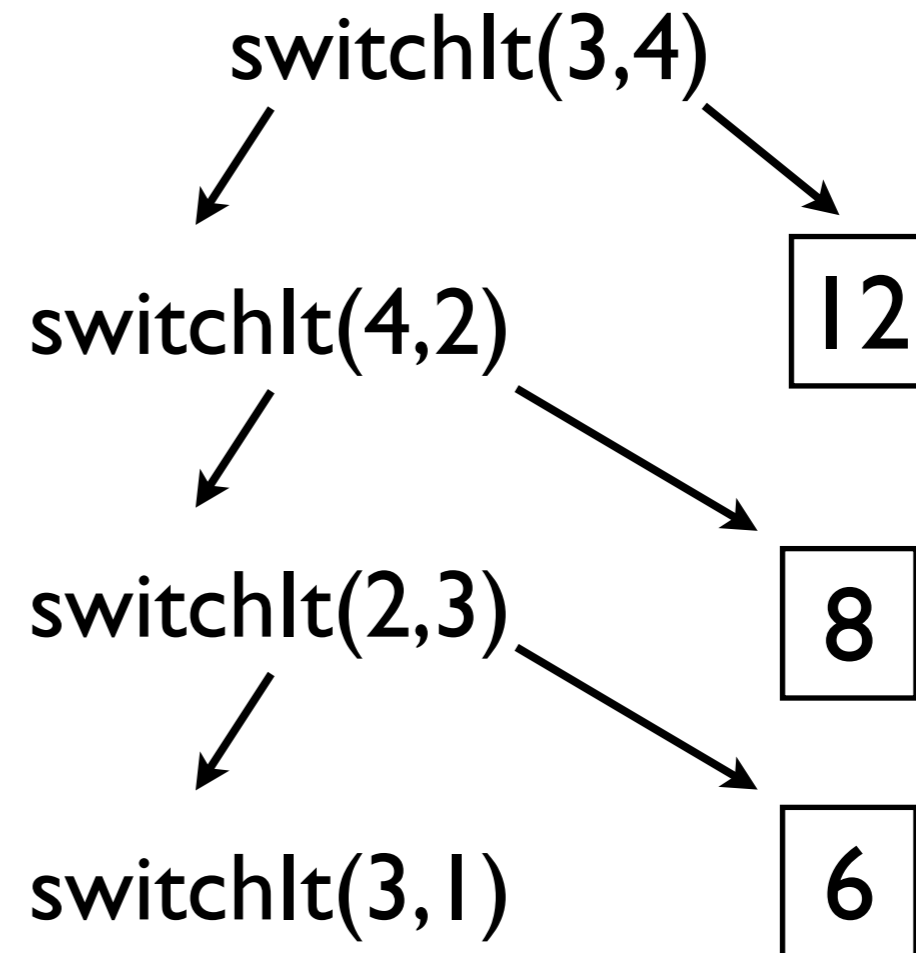
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        return 1;
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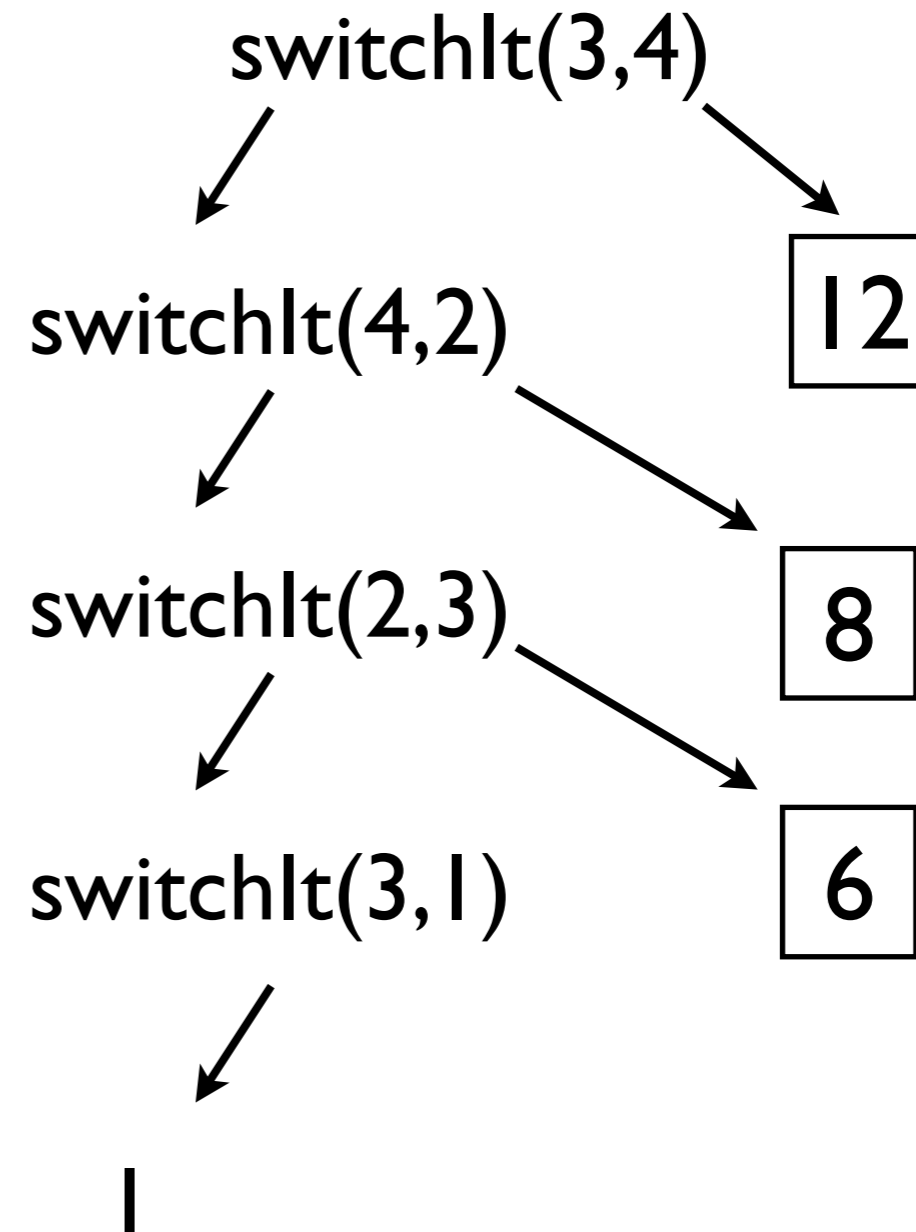
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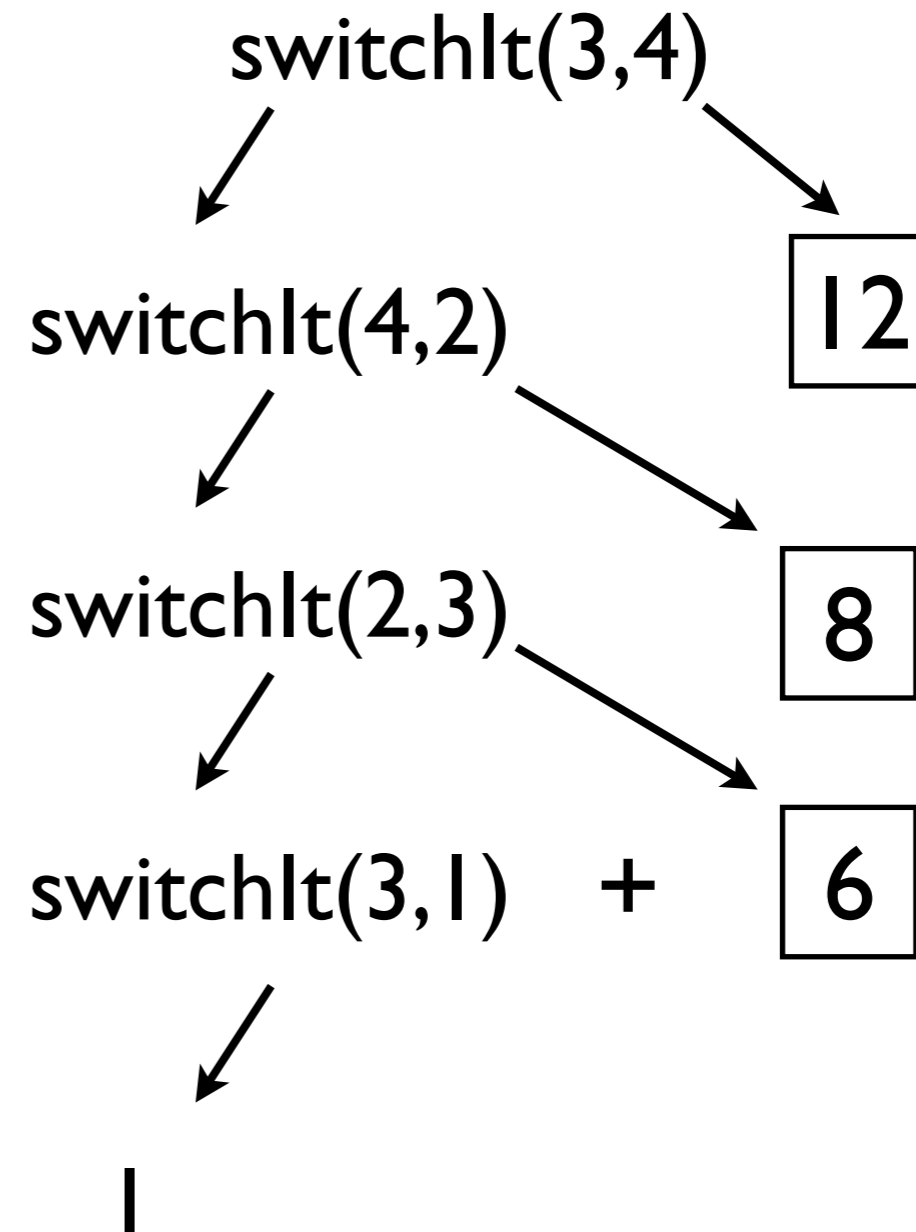
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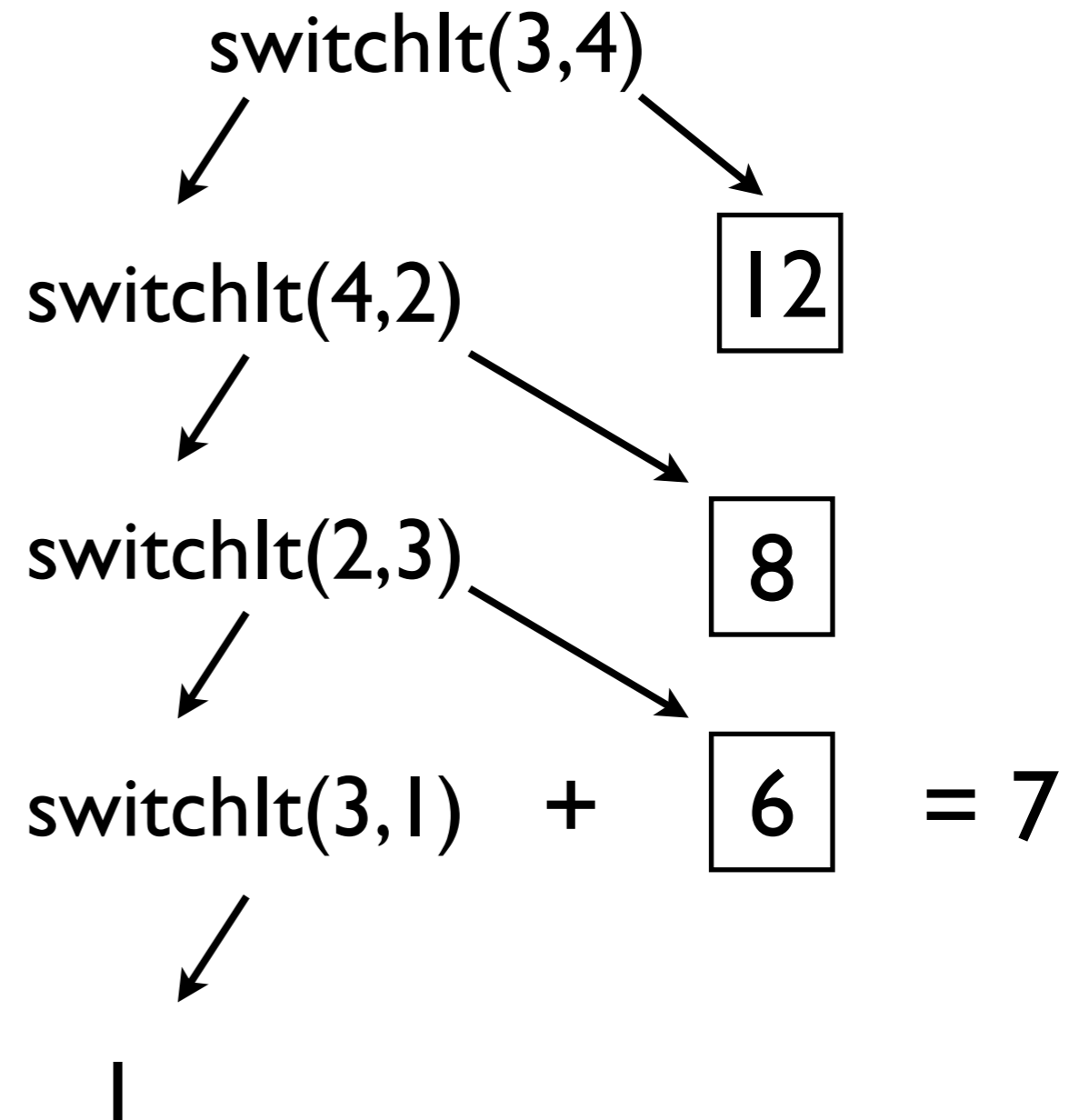
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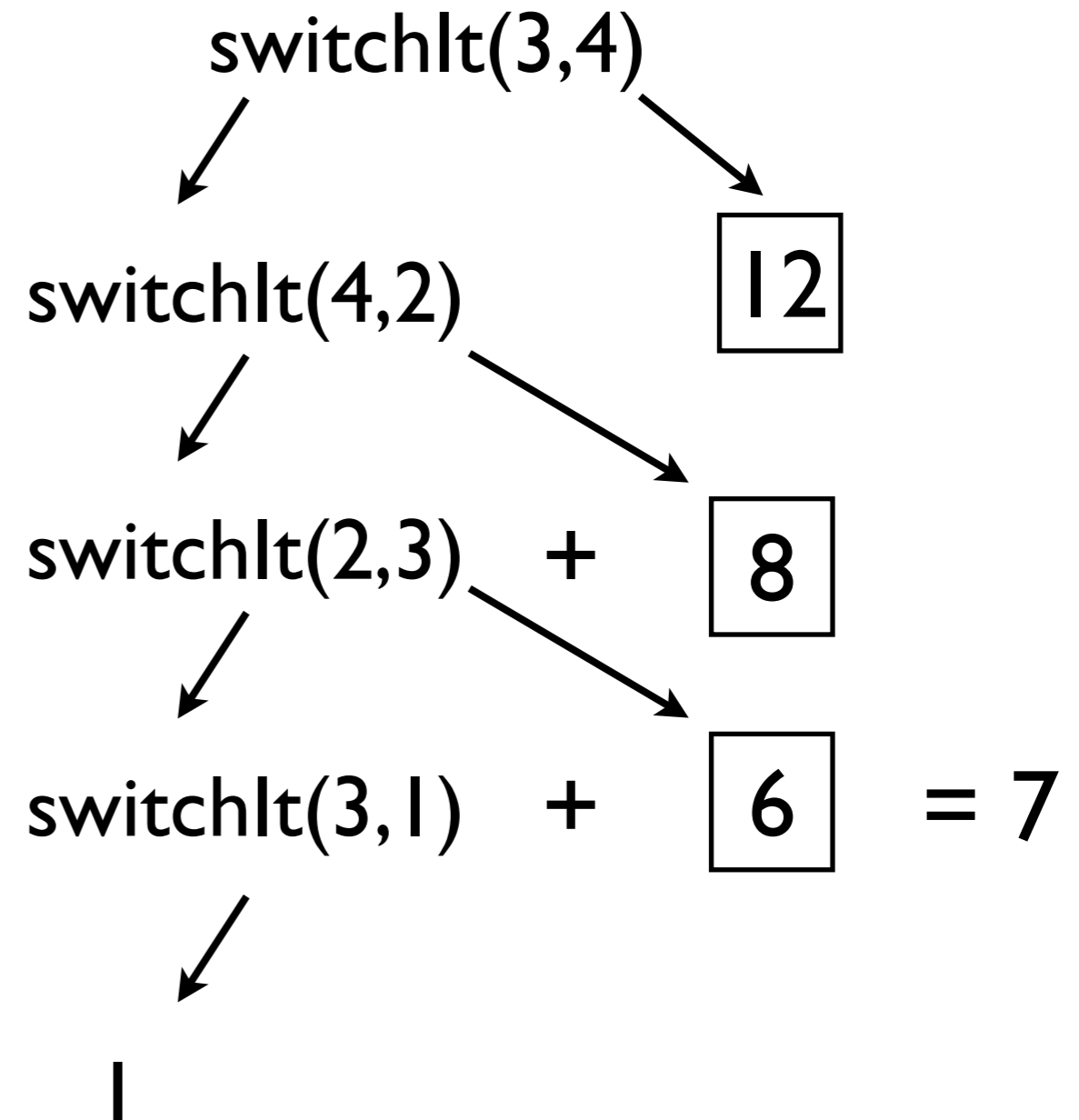
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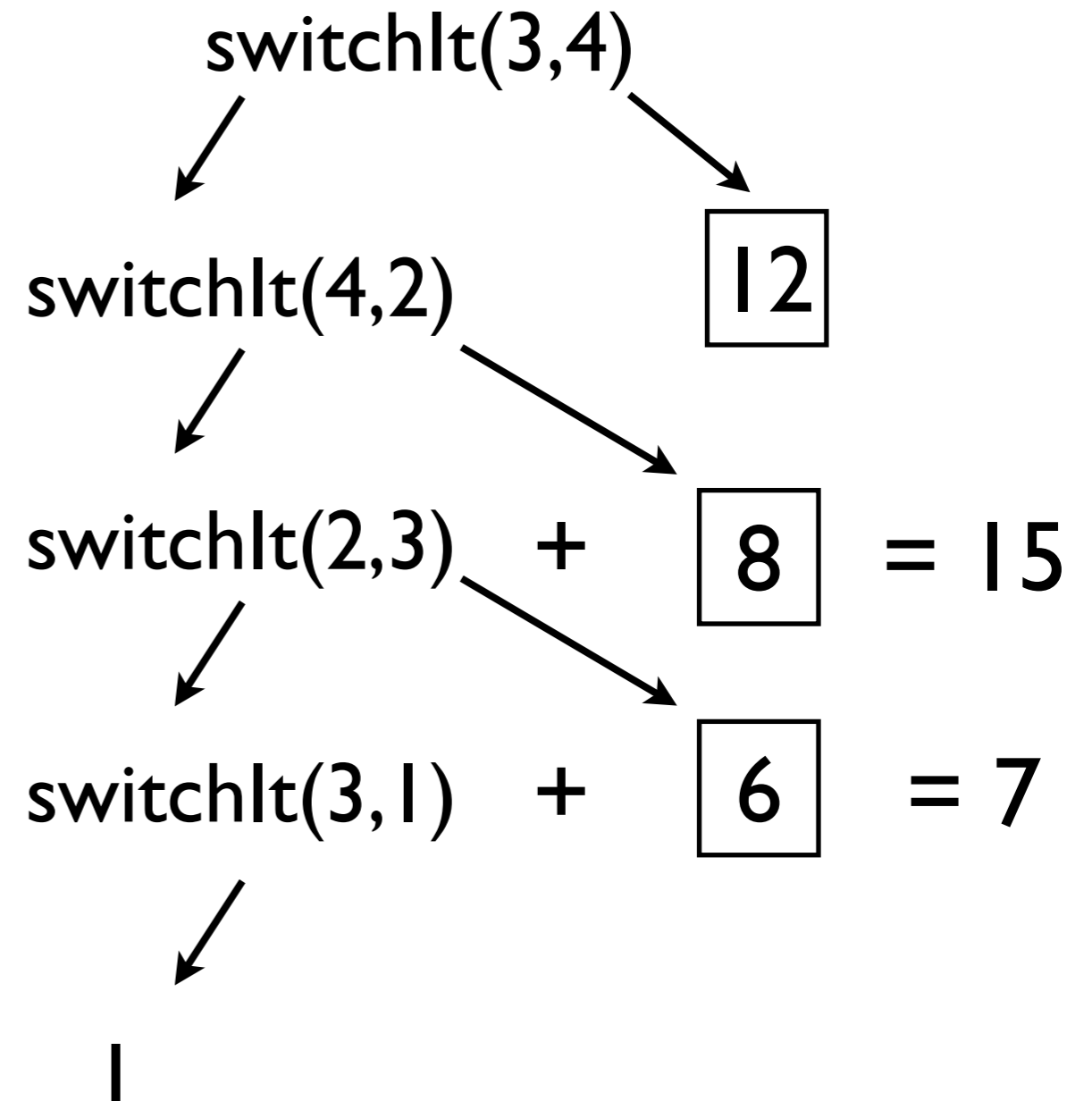
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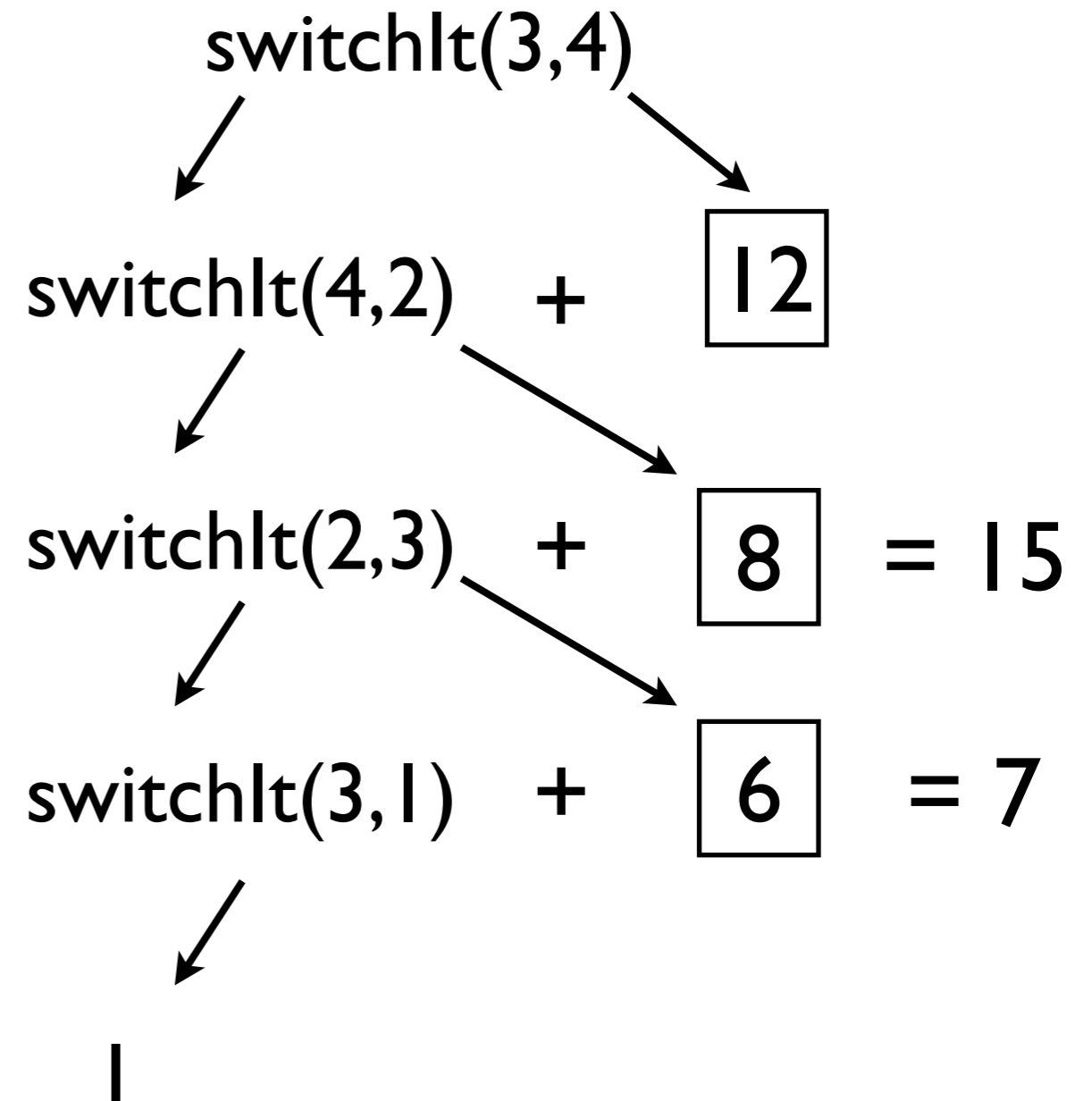
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Ex #7

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Ex #7

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