

# INFDEV02-2

## Homework 3

Dev Team

Abstraction, functions, recursion, and data structures.

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## Lecture Homework 3 - Lines

Draw line Fill in the missing code blocks

```

1 | def draw_line (          ):
2 |     res=""
3 |     while((n>          )):
4 |         res=(res+          )
5 |         n=(n-          )
6 |     return
7 |
8 | res=draw_line(3)
9 | print (          )

```

globals			
stack			
heap			
definitions			
<hr/>			
globals			
stack			
heap			
definitions	draw_line	(n) =>	...
<hr/>			
globals			
		ret	null
stack		n	3
		<hr/>	
heap			
definitions	draw_line	(n) =>	...
<hr/>			
globals			
		ret	null
stack		n	3
		res	""
		<hr/>	
heap			
definitions	draw_line	(n) =>	...
<hr/>			

---

```

globals
    ret null
stack    n    3
        res   "*"
heap
definitions draw_line (n) => ...

```

---

```

globals
    ret null
stack    n    2
        res   "*"
heap
definitions draw_line (n) => ...

```

---

```

globals
    ret null
stack    n    2
        res   "*"
heap
definitions draw_line (n) => ...

```

---

```

globals
    ret null
stack    n    2
        res   "*"
heap
definitions draw_line (n) => ...

```

---

```

globals
    ret null
stack    n    1
        res   "*"
heap
definitions draw_line (n) => ...

```

---

```

globals
    ret null
stack    n    1
        res   "*"
heap
definitions draw_line (n) => ...

```

---

---

```

globals
                                ret    null
stack                          n        1
                                res    "****"
                                -----
heap
definitions  draw_line  (n) => ...

```

---

```

globals
                                ret    null
stack                          n        0
                                res    "****"
                                -----
heap
definitions  draw_line  (n) => ...

```

---

```

globals
                                ret    null
stack                          n        0
                                res    "****"
                                -----
heap
definitions  draw_line  (n) => ...

```

---

```

globals
                                ret    "****"
stack                          n        0
                                res    "****"
                                -----
heap
definitions  draw_line  (n) => ...

```

---

```

globals
stack
heap
definitions  draw_line  (n) => ...

```

---

```

globals          res    "****"
stack
heap
definitions  draw_line  (n) => ...

```

---

---

globals	res	***"
stack		
heap		
definitions	draw_line	(n) => ...
output		***"

---

**Repeat** Fill in the missing code blocks

```

1 | def repeat (          ,          ):
2 |     res=
3 |     while((n>          )):
4 |         =(res+symbol)
5 |         n=(n-1)
6 |     return
7 |
8 | res=          ("#",3)
9 | print (          )

```

globals		
stack		
heap		
definitions		
<hr/>		
globals		
stack		
heap		
definitions	repeat	(symbol,n) => ...
<hr/>		
globals		
	ret	null
stack	symbol	"#"
	n	3
<hr/>		
heap		
definitions	repeat	(symbol,n) => ...
<hr/>		
globals		
	ret	null
	symbol	"#"
stack	n	3
	res	" "
<hr/>		
heap		
definitions	repeat	(symbol,n) => ...
<hr/>		

---

```

globals
    ret      null
    symbol   "#"
stack
    n        3
    res      ""

```

---

```

heap
definitions repeat (symbol,n) => ...

```

---

```

globals
    ret      null
    symbol   "#"
stack
    n        3
    res      ""

```

---

```

heap
definitions repeat (symbol,n) => ...

```

---

```

globals
    ret      null
    symbol   "#"
stack
    n        2
    res      ""

```

---

```

heap
definitions repeat (symbol,n) => ...

```

---

```

globals
    ret      null
    symbol   "#"
stack
    n        2
    res      ""

```

---

```

heap
definitions repeat (symbol,n) => ...

```

---

```

globals
    ret      null
    symbol   "#"
stack
    n        2
    res      ""

```

---

```

heap
definitions repeat (symbol,n) => ...

```

---

```

globals
    ret      null
    symbol   "#"
stack
    n        2
    res      ""

```

---

```

heap
definitions repeat (symbol,n) => ...

```

---

```

globals
    ret      null
    symbol   "#"
stack
    n        2
    res      ""

```

---

```

heap
definitions repeat (symbol,n) => ...

```

---

```

globals
    ret      null
    symbol   "#"
stack
    n        2
    res      ""

```

---

```

heap
definitions repeat (symbol,n) => ...

```

---

---

```

globals
    ret      null
    symbol   "#"
stack
    n        1
    res      "##"
heap
definitions repeat (symbol,n) => ...

```

---

```

globals
    ret      null
    symbol   "#"
stack
    n        1
    res      "##"
heap
definitions repeat (symbol,n) => ...

```

---

```

globals
    ret      null
    symbol   "#"
stack
    n        1
    res      "###"
heap
definitions repeat (symbol,n) => ...

```

---

```

globals
    ret      null
    symbol   "#"
stack
    n        0
    res      "###"
heap
definitions repeat (symbol,n) => ...

```

---

```

globals
    ret      null
    symbol   "#"
stack
    n        0
    res      "###"
heap
definitions repeat (symbol,n) => ...

```

---



---

```

globals
                                ret      "###"
                                symbol    "#"
stack                            n        0
                                res       "###"
                                _____

heap
definitions  repeat  (symbol,n) => ...
_____
globals
stack
heap
definitions  repeat  (symbol,n) => ...
_____
globals                res  "###"
stack
heap
definitions  repeat  (symbol,n) => ...
_____
globals                res  "###"
stack
heap
definitions  repeat  (symbol,n) => ...
output                "###"
_____

```

## Lecture Homework 3 - Squares

**Square** Fill in the missing code blocks

```

1 def repeat (symbol,n):
2     res=""
3     while((n>0)):
4         res=(res+symbol)
5         n=(n-1)
6     return res
7
8 def draw_line (n):
9     return repeat(" ",      )
10
11 def draw_square (n):
12     l=(draw_line(          ) +"\n")
13     return repeat(          ,          )
14
15 res=draw_square(3)
16
17 print (          )

```

globals	
stack	
heap	
definitions	
<hr/>	
globals	
stack	
heap	
definitions	repeat (symbol,n) => ...
<hr/>	
globals	
stack	
heap	
definitions	repeat (symbol,n) => ...
	draw_line (n) => ...
<hr/>	
globals	
stack	
heap	
definitions	repeat (symbol,n) => ...
	draw_line (n) => ...
	draw_square (n) => ...
<hr/>	

---

globals		
	ret	null
stack	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...

---

globals		
	ret	null
	n	3
stack	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...

---

globals		
	ret	null
	symbol	"*"
	n	3
stack	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...

---

globals		
	ret	null
	symbol	"*"
	n	3
	res	" "
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...

---

globals		
	ret	null
	symbol	"*"
	n	3
	res	" "
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...

<hr/>		
globals		
	ret	null
	symbol	"*"
	n	3
	res	"*"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	"*"
	n	2
	res	"*"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		

<hr/>		
globals		
	ret	null
	symbol	"*"
	n	2
	res	"*"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	"*"
	n	2
	res	"**"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		

globals		
	ret	null
	symbol	"*"
	n	1
	res	"**"
stack		
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
globals		
	ret	null
	symbol	"*"
	n	1
	res	"**"
stack		
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...

<hr/>		
globals		
	ret	null
	symbol	"*"
	n	1
	res	"***"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	"*"
	n	0
	res	"***"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		



globals		
	ret	null
	symbol	"*"
	n	0
	res	"***"
stack		
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
globals		
	ret	"***"
	symbol	"*"
	n	0
	res	"***"
stack		
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
globals		
	ret	null
	n	3
stack		
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...

globals		
	ret	****
stack	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
globals		
	ret	null
stack	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
globals		
	ret	null
stack	n	3
	1	***\n
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
globals		
	ret	null
	symbol	***\n
stack	n	3
	ret	null
	n	3
	1	***\n
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...

<hr/>		
globals		
	ret	null
	symbol	***\n
	n	3
stack	res	" "
	<hr/>	
	ret	null
	n	3
	l	***\n
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	***\n
	n	3
stack	res	" "
	<hr/>	
	ret	null
	n	3
	l	***\n
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	***\n
	n	3
stack	res	***\n
	<hr/>	
	ret	null
	n	3
	l	***\n
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		

<hr/>		
globals		
	ret	null
	symbol	***\n
	n	2
stack	res	***\n
	ret	null
	n	3
	l	***\n
heap		
definitions	repeat	(symbol,n) => ...
	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	***\n
	n	2
stack	res	***\n
	ret	null
	n	3
	l	***\n
heap		
definitions	repeat	(symbol,n) => ...
	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	***\n
	n	2
stack	res	***\n***\n
	ret	null
	n	3
	l	***\n
heap		
definitions	repeat	(symbol,n) => ...
	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		

<hr/>		
globals		
	ret	null
	symbol	***\n
	n	1
stack	res	***\n***\n
	<hr/>	
	ret	null
	n	3
	l	***\n
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	***\n
	n	1
stack	res	***\n***\n
	<hr/>	
	ret	null
	n	3
	l	***\n
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	***\n
	n	1
stack	res	***\n***\n***\n
	<hr/>	
	ret	null
	n	3
	l	***\n
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		

globals		
	ret	null
	symbol	***\n
	n	0
stack	res	***\n***\n***\n
<hr/>		
	ret	null
	n	3
	l	***\n
<hr/>		
heap		
definitions	repeat	(symbol,n) => ...
	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	***\n
	n	0
stack	res	***\n***\n***\n
<hr/>		
	ret	null
	n	3
	l	***\n
<hr/>		
heap		
definitions	repeat	(symbol,n) => ...
	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		
globals		
	ret	***\n***\n***\n
	symbol	***\n
	n	0
stack	res	***\n***\n***\n
<hr/>		
	ret	null
	n	3
	l	***\n
<hr/>		
heap		
definitions	repeat	(symbol,n) => ...
	draw_line	(n) => ...
	draw_square	(n) => ...
<hr/>		

globals		
	ret	null
stack	n	3
	1	***\n"
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
globals		
	ret	***\n***\n***\n"
stack	n	3
	1	***\n"
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
globals		
stack		
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
globals	res	***\n***\n***\n"
stack		
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
globals	res	***\n***\n***\n"
stack		
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_square	(n) => ...
output		***\n***\n***\n"

### Empty square Fill in the missing code blocks

```

1 def repeat (symbol,n):
2     res=""
3     while((n>0)):
4         res=(res+symbol)
5         n=(n-1)
6     return res
7
8
9 def draw_line (n):
10     return repeat(" ",      )
11
12 def draw_empty_square (n):
13     l=(draw_line(      ) +"\n")
14     empty_line=(      +(repeat(" ",(n-2)) +"*\n"))
15     return (      +(repeat(empty_line,(n-      )) +
16                    ))
17
18 res=draw_empty_square(      )
19 print (      )

```

globals

stack

heap

definitions

---

globals

stack

heap

definitions      repeat    (symbol,n) => ...

---

globals

stack

heap

definitions      repeat      (symbol,n) => ...

draw\_line          (n) => ...

---



<hr/>			
globals			
stack			
heap			
	repeat	(symbol,n) =>	...
definitions	draw_line	(n) =>	...
	draw_empty_square	(n) =>	...
<hr/>			
globals			
		ret	null
stack		n	3
	<hr/>		
heap			
	repeat	(symbol,n) =>	...
definitions	draw_line	(n) =>	...
	draw_empty_square	(n) =>	...
<hr/>			
globals			
		ret	null
		n	3
stack		<hr/>	
		ret	null
		n	3
	<hr/>		
heap			
	repeat	(symbol,n) =>	...
definitions	draw_line	(n) =>	...
	draw_empty_square	(n) =>	...
<hr/>			
globals			
		ret	null
		symbol	"*"
		n	3
	<hr/>		
stack		ret	null
		n	3
	<hr/>		
		ret	null
		n	3
	<hr/>		
heap			
	repeat	(symbol,n) =>	...
definitions	draw_line	(n) =>	...
	draw_empty_square	(n) =>	...
<hr/>			

globals		
	ret	null
	symbol	"*"
	n	3
	res	" "
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
globals		
	ret	null
	symbol	"*"
	n	3
	res	" "
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...

globals		
	ret	null
	symbol	"*"
	n	3
	res	"*"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
globals		
	ret	null
	symbol	"*"
	n	2
	res	"*"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...

globals		
	ret	null
	symbol	"*"
	n	2
	res	"*"
stack		
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
globals		
	ret	null
	symbol	"*"
	n	2
	res	"**"
stack		
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...

globals		
	ret	null
	symbol	"*"
	n	1
	res	"**"
stack		
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
globals		
	ret	null
	symbol	"*"
	n	1
	res	"**"
stack		
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...

globals		
	ret	null
	symbol	"*"
	n	1
	res	"***"
stack		
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
globals		
	ret	null
	symbol	"*"
	n	0
	res	"***"
stack		
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...

globals			
		ret	null
		symbol	"*"
		n	0
		res	"****"
stack			
		ret	null
		n	3
heap			
	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_empty_square	(n) => ...	
globals			
		ret	"****"
		symbol	"*"
		n	0
		res	"****"
stack			
		ret	null
		n	3
heap			
	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_empty_square	(n) => ...	
globals			
		ret	null
		n	3
stack			
		ret	null
		n	3
heap			
	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_empty_square	(n) => ...	

<hr/>			
globals		ret	****
		n	3
stack		ret	null
		n	3
heap			
	repeat		(symbol,n) => ...
definitions	draw_line		(n) => ...
	draw_empty_square		(n) => ...
<hr/>			
globals		ret	null
		n	3
heap			
	repeat		(symbol,n) => ...
definitions	draw_line		(n) => ...
	draw_empty_square		(n) => ...
<hr/>			
globals		ret	null
		n	3
stack		1	***\n
heap			
	repeat		(symbol,n) => ...
definitions	draw_line		(n) => ...
	draw_empty_square		(n) => ...
<hr/>			
globals		ret	null
		symbol	" "
		n	1
stack		ret	null
		n	3
		1	***\n
heap			
	repeat		(symbol,n) => ...
definitions	draw_line		(n) => ...
	draw_empty_square		(n) => ...
<hr/>			



<hr/>		
globals		
	ret	null
	symbol	" "
	n	1
stack	res	" "
	ret	null
	n	3
	l	***\n"
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	" "
	n	1
stack	res	" "
	ret	null
	n	3
	l	***\n"
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	" "
	n	1
stack	res	" "
	ret	null
	n	3
	l	***\n"
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		

<hr/>		
globals		
	ret	null
	symbol	" "
	n	0
stack	res	" "
	<hr/>	
	ret	null
	n	3
	l	***\n"
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	" "
	n	0
stack	res	" "
	<hr/>	
	ret	null
	n	3
	l	***\n"
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		
globals		
	ret	" "
	symbol	" "
	n	0
stack	res	" "
	<hr/>	
	ret	null
	n	3
	l	***\n"
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		

<hr/>		
globals		
	ret	null
stack	n	3
	1	***\n"
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		
globals		
	ret	null
stack	n	3
	1	***\n"
	empty_line	* *\n"
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	* *\n"
	n	1
stack	ret	null
	n	3
	1	***\n"
	empty_line	* *\n"
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		

<hr/>		
globals		
	ret	null
	symbol	"* *\n"
	n	1
	res	" "
stack	<hr/>	
	ret	null
	n	3
	l	"***\n"
	empty_line	"* *\n"
heap	<hr/>	
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	"* *\n"
	n	1
	res	" "
stack	<hr/>	
	ret	null
	n	3
	l	"***\n"
	empty_line	"* *\n"
heap	<hr/>	
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		

<hr/>		
globals		
	ret	null
	symbol	"* *\n"
	n	1
	res	"* *\n"
stack		<hr/>
	ret	null
	n	3
	l	"***\n"
	empty_line	"* *\n"
heap		<hr/>
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	"* *\n"
	n	0
	res	"* *\n"
stack		<hr/>
	ret	null
	n	3
	l	"***\n"
	empty_line	"* *\n"
heap		<hr/>
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		

globals		
	ret	null
	symbol	"* *\n"
	n	0
	res	"* *\n"
stack		
	ret	null
	n	3
	l	"***\n"
	empty_line	"* *\n"
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
globals		
	ret	"* *\n"
	symbol	"* *\n"
	n	0
	res	"* *\n"
stack		
	ret	null
	n	3
	l	"***\n"
	empty_line	"* *\n"
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
globals		
	ret	null
stack		
	n	3
	l	"***\n"
	empty_line	"* *\n"
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...

<hr/>		
globals	ret	***\n* *\n***\n"
	n	3
stack	l	***\n"
	empty_line	* *\n"
<hr/>		
heap	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		
globals		
stack		
heap	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		
globals	res	***\n* *\n***\n"
stack		
heap	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
<hr/>		
globals	res	***\n* *\n***\n"
stack		
heap	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_empty_square	(n) => ...
output		***\n* *\n***\n"
<hr/>		

## Lecture Homework 3 - Triangles



## Draw triangle Fill in the missing code blocks

```

1 def repeat (symbol,n):
2     res=""
3     while((n>0)):
4         res=(res+symbol)
5         n=(n-1)
6     return res
7
8 def draw_line (n):
9     return repeat(" ",n)
10
11 def draw_triangle (n):
12     if((n<=0)):
13         return
14     else:
15         return (draw_line(          )+"\n"+draw_triangle((
16             -          )))
17
18 res=draw_triangle(          )
19 print (res)

```

globals

stack

heap

definitions

---

globals

stack

heap

definitions      repeat    (symbol,n) => ...

---

globals

stack

heap

definitions      repeat            (symbol,n) => ...  
draw\_line            (n) => ...

---

globals

stack

heap

definitions      repeat                    (symbol,n) => ...  
draw\_line                    (n) => ...  
draw\_triangle                (n) => ...

---



<hr/>			
globals			
		ret	null
stack		n	3
		<hr/>	
heap			
	repeat	(symbol,n)	=> ...
definitions	draw_line	(n)	=> ...
	draw_triangle	(n)	=> ...
<hr/>			
globals			
		ret	null
stack		n	3
		<hr/>	
heap			
	repeat	(symbol,n)	=> ...
definitions	draw_line	(n)	=> ...
	draw_triangle	(n)	=> ...
<hr/>			
globals			
		ret	null
		n	3
stack		<hr/>	
		ret	null
		n	3
		<hr/>	
heap			
	repeat	(symbol,n)	=> ...
definitions	draw_line	(n)	=> ...
	draw_triangle	(n)	=> ...
<hr/>			
globals			
		ret	null
		symbol	"*"
		n	3
		<hr/>	
stack		ret	null
		n	3
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap			
	repeat	(symbol,n)	=> ...
definitions	draw_line	(n)	=> ...
	draw_triangle	(n)	=> ...
<hr/>			

<hr/>		
globals		
	ret	null
	symbol	"*"
	n	3
	res	" "
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	"*"
	n	3
	res	" "
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		

<hr/>		
globals		
	ret	null
	symbol	"*"
	n	3
	res	"*"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	"*"
	n	2
	res	"*"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		

<hr/>		
globals		
	ret	null
	symbol	"*"
	n	2
	res	"*"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	"*"
	n	2
	res	"**"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		

<hr/>		
globals		
	ret	null
	symbol	"*"
	n	1
	res	"**"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	"*"
	n	1
	res	"**"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		

<hr/>		
globals		
	ret	null
	symbol	"*"
	n	1
	res	"***"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	"*"
	n	0
	res	"***"
stack		
	ret	null
	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		

globals		
	ret	null
	symbol	"*"
	n	0
	res	"***"
stack		
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
globals		
	ret	"***"
	symbol	"*"
	n	0
	res	"***"
stack		
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
globals		
	ret	null
	n	3
stack		
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...



globals		
	ret	****
stack	n	3
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
globals		
	ret	null
stack	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
globals		
	ret	null
stack	n	2
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
globals		
	ret	null
stack	n	2
	ret	null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...

---

globals		ret	null
		n	2
		<hr/>	
stack		ret	null
		n	2
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	

---

globals		ret	null
		symbol	"*"
		n	2
		<hr/>	
stack		ret	null
		n	2
		<hr/>	
		ret	null
		n	2
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	

---

globals		ret	null
		symbol	"*"
		n	2
		res	" "
stack		ret	null
		n	2
		ret	null
		n	2
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	
globals		ret	null
		symbol	"*"
		n	2
		res	" "
stack		ret	null
		n	2
		ret	null
		n	2
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	

globals		ret	null
		symbol	"*"
		n	2
		res	"*"
stack		ret	null
		n	2
		ret	null
		n	2
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	
globals		ret	null
		symbol	"*"
		n	1
		res	"*"
stack		ret	null
		n	2
		ret	null
		n	2
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	

globals		ret	null
		symbol	"*"
		n	1
		res	"*"
stack		ret	null
		n	2
		ret	null
		n	2
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	
globals		ret	null
		symbol	"*"
		n	1
		res	"**"
stack		ret	null
		n	2
		ret	null
		n	2
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	

globals		ret	null
		symbol	"*"
		n	0
		res	"**"
stack		ret	null
		n	2
		ret	null
		n	2
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	
globals		ret	null
		symbol	"*"
		n	0
		res	"**"
stack		ret	null
		n	2
		ret	null
		n	2
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	

globals		
	ret	***
	symbol	*
	n	0
	res	***
<hr/>		
stack	ret	null
	n	2
	ret	null
	n	2
<hr/>		
heap	ret	null
	n	3
	repeat	(symbol,n) => ...
	draw_line	(n) => ...
<hr/>		
globals		
	ret	null
	n	2
<hr/>		
stack	ret	null
	n	2
	ret	null
	n	3
<hr/>		
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		

---

globals		ret	""
		n	2
		<hr/>	
stack		ret	null
		n	2
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	

---

globals		ret	null
		n	2
		<hr/>	
stack		ret	null
		n	3
		<hr/>	
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	

---

globals		ret	null
		n	1
		<hr/>	
stack		ret	null
		n	2
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	

---



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globals		ret	null
		n	1
		<hr/>	
stack		ret	null
		n	2
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	

---

globals		ret	null
		n	1
		<hr/>	
		ret	null
		n	1
		<hr/>	
stack		ret	null
		n	2
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap	repeat	(symbol,n) => ...	
definitions	draw_line	(n) => ...	
	draw_triangle	(n) => ...	

---

globals		ret	null
		symbol	"*"
		n	1
		ret	null
		n	1
stack		ret	null
		n	1
		ret	null
		n	2
		ret	null
		n	3
heap		repeat	(symbol,n) => ...
definitions	draw_line	(n) =>	...
	draw_triangle	(n) =>	...
globals		ret	null
		symbol	"*"
		n	1
		res	" "
		ret	null
		n	1
stack		ret	null
		n	1
		ret	null
		n	2
		ret	null
		n	3
heap		repeat	(symbol,n) => ...
definitions	draw_line	(n) =>	...
	draw_triangle	(n) =>	...

<hr/>		
globals		ret      null
		symbol    "*"
		n          1
		res        ""
		<hr/>
		ret    null
		n      1
		<hr/>
		ret    null
		n      1
stack		<hr/>
		ret    null
		n      1
		<hr/>
		ret    null
		n      2
		<hr/>
		ret    null
		n      3
		<hr/>
	heap	
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		ret      null
		symbol    "*"
		n          1
		res        "*"
		<hr/>
		ret    null
		n      1
		<hr/>
		ret    null
		n      1
stack		<hr/>
		ret    null
		n      1
		<hr/>
		ret    null
		n      2
		<hr/>
		ret    null
		n      3
		<hr/>
	heap	
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		

<hr/>		
globals		
	ret	null
	symbol	"*"
	n	0
	res	"*"
	<hr/>	
	ret	null
	n	1
stack	<hr/>	
	ret	null
	n	1
	<hr/>	
	ret	null
	n	2
	<hr/>	
	ret	null
	n	3
	<hr/>	
heap	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		
	ret	null
	symbol	"*"
	n	0
	res	"*"
	<hr/>	
	ret	null
	n	1
stack	<hr/>	
	ret	null
	n	1
	<hr/>	
	ret	null
	n	2
	<hr/>	
	ret	null
	n	3
	<hr/>	
heap	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		

<hr/>		
globals		
	ret	"*"
	symbol	"*"
	n	0
	res	"*"
	<hr/>	
	ret	null
	n	1
stack	<hr/>	
	ret	null
	n	1
	<hr/>	
	ret	null
	n	2
	<hr/>	
	ret	null
	n	3
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		
	ret	null
	n	1
	<hr/>	
	ret	null
	n	1
stack	<hr/>	
	ret	null
	n	2
	<hr/>	
	ret	null
	n	3
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		

<hr/>		
globals		
		ret  "＊"
		n     1
		<hr/>
		ret  null
		n     1
stack		<hr/>
		ret  null
		n     2
		<hr/>
		ret  null
		n     3
		<hr/>
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		
		ret  null
		n     1
		<hr/>
		ret  null
stack		<hr/>
		n     2
		<hr/>
		ret  null
		n     3
		<hr/>
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		

<hr/>		
globals		
	ret	null
	n	0
	<hr/>	
	ret	null
	n	1
<hr/>		
stack	ret	null
	n	2
	<hr/>	
	ret	null
	n	3
<hr/>		
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		
	ret	null
	n	0
	<hr/>	
	ret	null
	n	1
<hr/>		
stack	ret	null
	n	2
	<hr/>	
	ret	null
	n	3
<hr/>		
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		

<hr/>		
globals		
		ret ""
		n 0
		<hr/>
		ret null
		n 1
stack		<hr/>
		ret null
		n 2
		<hr/>
		ret null
		n 3
		<hr/>
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		
		ret null
		n 1
		<hr/>
		ret null
stack		<hr/>
		n 2
		<hr/>
		ret null
		n 3
		<hr/>
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		
		ret "*\n"
		n 1
		<hr/>
		ret null
stack		<hr/>
		n 2
		<hr/>
		ret null
		n 3
		<hr/>
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		



<hr/>		
globals		ret null
	n	2
stack		ret null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		ret "**\n*\n"
	n	2
stack		ret null
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		
		ret null
stack		n 3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		
globals		ret "***\n**\n*\n"
	n	3
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
<hr/>		

---

globals		
stack		
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...

---

globals	res	***\n**\n*\n"
stack		
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...

---

globals	res	***\n**\n*\n"
stack		
heap		
	repeat	(symbol,n) => ...
definitions	draw_line	(n) => ...
	draw_triangle	(n) => ...
output		***\n**\n*\n"

---

## Draw pyramid Fill in the missing state blocks

```

1 def repeat (symbol,n):
2     res=""
3     while((n>0)):
4         res=(res+symbol)
5         n=(n-1)
6     return res
7
8 def draw_pyramid_AUX (num_spaces,num_stars):
9     if((num_spaces<0)):
10        return ""
11    else:
12        spaces=repeat(" ",num_spaces)
13        stars=repeat("*",num_stars)
14        return (spaces+(stars+"\n"+draw_pyramid_AUX((num_spaces
15            -1),(num_stars+2)))))
16
17 def draw_pyramid (n):
18     return draw_pyramid_AUX((n-1),1)
19
20 res=draw_pyramid(3)
21 print (res)

```

globals

stack

heap

definitions

---

globals

stack

heap

definitions      repeat      (symbol,n) => ...

---

globals

stack

heap

definitions      repeat      (symbol,n) => ...  
draw\_pyramid\_AUX      (num\_spaces,num\_stars) => ...

---

globals

stack

heap

definitions      repeat      (symbol,n) => ...  
draw\_pyramid\_AUX      (num\_spaces,num\_stars) => ...  
draw\_pyramid      (n) => ...

---

---

globals			
		ret	null
stack		n	
heap	repeat		(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars)	=> ...
	draw_pyramid	(n)	=> ...

---

globals			
		ret	null
		num_spaces	2
stack		num_stars	1
		ret	null
		n	3
heap	repeat		(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars)	=> ...
	draw_pyramid	(n)	=> ...

---

globals			
		ret	null
		num_spaces	2
stack		num_stars	1
		ret	null
		n	3
heap	repeat		(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars)	=> ...
	draw_pyramid	(n)	=> ...

---

globals		ret	null
		symbol	" "
		n	2
stack		ret	null
		num_spaces	2
		num_stars	1
		ret	null
		n	
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	
globals		ret	null
		symbol	" "
		n	2
		res	""
stack		ret	null
		num_spaces	2
		num_stars	1
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	

globals		ret	null
		symbol	" "
		n	2
		res	" "
stack		ret	null
		num_spaces	2
		num_stars	1
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	
globals		ret	null
		symbol	" "
		n	2
		res	" "
stack		ret	null
		num_spaces	2
		num_stars	1
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	

globals		ret	null
		symbol	" "
		n	1
		res	" "
stack		ret	null
		num_spaces	2
		num_stars	1
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	
globals		ret	null
		symbol	" "
		n	1
		res	" "
stack		ret	null
		num_spaces	2
		num_stars	1
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	

globals		ret	null
		symbol	" "
		n	1
		res	" "
stack		ret	null
		num_spaces	2
		num_stars	1
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	
globals		ret	null
		symbol	" "
		n	0
		res	" "
stack		ret	null
		num_spaces	2
		num_stars	1
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	



globals		ret	null
		symbol	" "
		n	0
		res	" "
stack		ret	null
		num_spaces	2
		num_stars	1
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	
globals		ret	" "
		symbol	" "
		n	0
		res	" "
stack		ret	null
		num_spaces	2
		num_stars	1
		ret	
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	

globals			
		ret	null
		num_spaces	2
stack		num_stars	1
		ret	null
		n	3
heap			
	repeat		(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars)	=> ...
	draw_pyramid	(n)	=> ...
globals			
		ret	null
		num_spaces	2
stack		num_stars	1
		spaces	" "
		ret	null
		n	3
heap			
	repeat		(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars)	=> ...
	draw_pyramid	(n)	=> ...
globals			
		ret	null
		symbol	"*"
		n	1
		ret	null
stack		num_spaces	2
		num_stars	1
		spaces	" "
		ret	null
		n	3
heap			
	repeat		(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars)	=> ...
	draw_pyramid	(n)	=> ...

[illegible]

globals		
	ret	null
	symbol	"*"
	n	1
	res	"*"
stack		
	ret	null
	num_spaces	2
	num_stars	1
	spaces	" "
	ret	null
	n	3
heap	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...
globals		
	ret	null
	symbol	"*"
	n	0
	res	"*"
stack		
	ret	null
	num_spaces	2
	num_stars	1
	spaces	" "
	ret	null
	n	3
heap	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...

globals		ret	null
		symbol	"*"
		n	0
		res	"*"
stack		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	
globals		ret	"*"
		symbol	"*"
		n	0
		res	"*"
stack		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		ret	
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	

globals		
	ret	null
	num_spaces	2
	num_stars	1
stack	spaces	" "
	<hr/>	
	ret	null
	n	3
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...
<hr/>		
globals		
	ret	null
	num_spaces	2
	num_stars	1
stack	spaces	" "
	stars	"*"
	<hr/>	
	ret	null
	n	3
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...

---

globals		
		ret            null
		num_spaces    1
		num_stars     3
		-----
		ret            null
stack		num_spaces    2
		num_stars     1
		spaces        "  "
		stars          "*"
		-----
		ret   null
		n        3
		-----
heap	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...

---

globals		
		ret            null
		num_spaces    1
		num_stars     3
		-----
		ret            null
stack		num_spaces    2
		num_stars     1
		spaces        "  "
		stars          "*"
		-----
		ret   null
		n        3
		-----
heap	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...

---

---

globals		
		ret      null
		symbol   " "
		n          1
		-----
		ret          null
		num_spaces   1
		num_stars    3
		-----
stack		ret          null
		num_spaces   2
		num_stars    1
		spaces       " "
		stars        "*"
		-----
		ret   null
		n        3
		-----
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...

---



globals			
		ret	null
		symbol	" "
		n	1
		res	""
		<hr/>	
		ret	null
		num_spaces	1
		num_stars	3
stack		<hr/>	
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap			
	repeat		(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars)	=> ...
	draw_pyramid	(n)	=> ...

globals		ret	null
		symbol	" "
		n	1
		res	""
		<hr/>	
		ret	null
		num_spaces	1
		num_stars	3
stack		<hr/>	
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap			
	repeat	(symbol,n) =>	...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) =>	...
	draw_pyramid	(n) =>	...

```
ret      null
symbol   " "
n        1
res      ""
```

```
ret      null
num_spaces  1
num_stars   3
```

stack

```
ret      null
num_spaces  2
num_stars   1
spaces      "  "
stars       "*"

```

```
ret    null
n      3
```

# heap

```
repeat (symbol,n) => ...
```

```

definitions    draw_pyramid_AUX    (num_spaces,num_stars) => ...
               draw_pyramid        (n) => ...

```



globals		ret	null
		symbol	" "
		n	0
		res	" "
		<hr/>	
		ret	null
		num_spaces	1
		num_stars	3
stack		<hr/>	
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap			
	repeat		(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars)	=> ...
	draw_pyramid	(n)	=> ...

globals		ret	null
		symbol	" "
		n	0
		res	" "
		<hr/>	
		ret	null
		num_spaces	1
		num_stars	3
stack		<hr/>	
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap			
	repeat		(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars)	=> ...
	draw_pyramid	(n)	=> ...

globals		
		ret " "
		symbol " "
		n 0
		res " "
		ret null
		num_spaces 1
		num_stars 3
stack		ret null
		num_spaces 2
		num_stars 1
		spaces " "
		stars "*"
		ret
		n 3
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...
globals		
		ret null
		num_spaces 1
		num_stars 3
		ret null
		num_spaces 2
stack		num_stars 1
		spaces " "
		stars "*"
		ret null
		n 3
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...

globals		ret	null
		num_spaces	1
		num_stars	3
		spaces	" "
stack		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		ret	null
		n	3
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	
globals		ret	null
		symbol	"*"
		n	3
stack		ret	null
		num_spaces	1
		num_stars	3
		spaces	" "
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		ret	
		n	
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	

globals			
		ret	null
		symbol	"*"
		n	3
		res	" "
		<hr/>	
		ret	null
		num_spaces	1
		num_stars	3
stack		spaces	" "
		<hr/>	
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap			
	repeat		(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars)	=> ...
	draw_pyramid	(n)	=> ...



globals			
		ret	null
		symbol	"*"
		n	3
		res	" "
		<hr/>	
		ret	null
		num_spaces	1
		num_stars	3
stack		spaces	" "
		<hr/>	
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap			
	repeat		(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars)	=> ...
	draw_pyramid	(n)	=> ...

globals		
	ret	null
	symbol	"*"
	n	3
	res	"*"
	<hr/>	
	ret	null
	num_spaces	1
	num_stars	3
stack	spaces	" "
	<hr/>	
	ret	null
	num_spaces	2
	num_stars	1
	spaces	" "
	stars	"*"
	<hr/>	
	ret	null
	n	3
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...

globals			
		ret	null
		symbol	"*"
		n	2
		res	"*"
		<hr/>	
		ret	null
		num_spaces	1
		num_stars	3
stack		spaces	" "
		<hr/>	
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap			
	repeat		(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars)	=> ...
	draw_pyramid	(n)	=> ...

globals			
		ret	null
		symbol	"*"
		n	2
		res	"*"
		<hr/>	
		ret	null
		num_spaces	1
		num_stars	3
stack		spaces	" "
		<hr/>	
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap			
	repeat		(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars)	=> ...
	draw_pyramid	(n)	=> ...

globals		
	ret	null
	symbol	"*"
	n	2
	res	"**"
	<hr/>	
	ret	null
	num_spaces	1
	num_stars	3
stack	spaces	" "
	<hr/>	
	ret	null
	num_spaces	2
	num_stars	1
	spaces	" "
	stars	"**"
	<hr/>	
	ret	null
	n	3
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...





globals		
	ret	null
	symbol	"*"
	n	1
	res	"****"
	<hr/>	
	ret	null
	num_spaces	1
	num_stars	3
stack	spaces	" "
	<hr/>	
	ret	null
	num_spaces	2
	num_stars	1
	spaces	" "
	stars	"*"
	<hr/>	
	ret	null
	n	3
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...







globals		
		ret        "***"
		symbol    "*"
		n         0
		res        "***"
stack		ret        null
		num_spaces    1
		num_stars     3
		spaces        " "
		ret        null
		num_spaces    2
		num_stars     1
		spaces        " "
		stars         "*"
		ret        null
		n         3
heap	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...
globals		
		ret        null
		num_spaces    1
		num_stars     3
		spaces        " "
stack		ret        null
		num_spaces    2
		num_stars     1
		spaces        " "
		stars         "*"
		ret    null
		n       3
heap	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...

```

globals
    ret      null
    num_spaces  1
    num_stars   3
    spaces      " "
    stars       "***"
    -----
stack
    ret      null
    num_spaces  2
    num_stars   1
    spaces      "  "
    stars       "*"
    -----
    ret      null
    n        3
    -----

heap

repeat      (symbol,n) => ...
definitions draw_pyramid_AUX (num_spaces,num_stars) => ...
              draw_pyramid      (n) => ...

```

---

globals		ret	null
		num_spaces	0
		num_stars	5
		<hr/>	
		ret	null
		num_spaces	1
		num_stars	3
		spaces	" "
	stack	stars	"***"
		<hr/>	
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	

---

---

globals		
	ret	null
	num_spaces	0
	num_stars	5
	<hr/>	
	ret	null
	num_spaces	1
	num_stars	3
	spaces	" "
stack	stars	"***"
	<hr/>	
	ret	null
	num_spaces	2
	num_stars	1
	spaces	" "
	stars	"*"
	<hr/>	
	ret	null
	n	3
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...

---

---

globals		ret	null
		symbol	" "
		n	0
		<hr/>	
		ret	null
		num_spaces	0
		num_stars	5
		<hr/>	
		ret	null
		num_spaces	1
stack		num_stars	3
		spaces	" "
		stars	"***"
		<hr/>	
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		<hr/>	
heap		ret	null
		n	3
		<hr/>	
	repeat	(symbol,n) => ...	
	definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
		draw_pyramid	(n) => ...
	<hr/>		

---





---

globals		ret	null
		symbol	" "
		n	0
		res	" "
		<hr/>	
		ret	null
		num_spaces	0
		num_stars	5
		<hr/>	
		ret	null
		num_spaces	1
stack		num_stars	3
		spaces	" "
		stars	"***"
		<hr/>	
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	

---



---

globals		
	ret	null
	num_spaces	0
	num_stars	5
	<hr/>	
	ret	null
	num_spaces	1
	num_stars	3
	spaces	" "
stack	stars	"***"
	<hr/>	
	ret	null
	num_spaces	2
	num_stars	1
	spaces	" "
	stars	"*"
	<hr/>	
	ret	null
	n	3
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...

---

---

globals		ret	null
		num_spaces	0
		num_stars	5
		spaces	" "
		<hr/>	
		ret	null
		num_spaces	1
		num_stars	3
		spaces	" "
		stars	"***"
stack		<hr/>	
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	

---

---

globals		ret	null
		symbol	"*"
		n	5
		<hr/>	
		ret	null
		num_spaces	0
		num_stars	5
		spaces	" "
		<hr/>	
		ret	null
stack		num_spaces	1
		num_stars	3
		spaces	" "
		stars	"***"
		<hr/>	
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
heap		<hr/>	
		ret	null
		n	
		<hr/>	
	repeat	(symbol,n) => ...	
	definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
		draw_pyramid	(n) => ...
		<hr/>	







































---

globals		ret	"*****"
		symbol	"*"
		n	0
		res	"*****"
		ret	null
		num_spaces	0
		num_stars	5
		spaces	" "
		ret	null
		num_spaces	1
stack		num_stars	3
		spaces	" "
		stars	"***"
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		ret	
		n	3
heap			
	repeat		(symbol,n) => ...
definitions	draw_pyramid_AUX		(num_spaces,num_stars) => ...
	draw_pyramid		(n) => ...

---

---

globals		ret	null
		num_spaces	0
		num_stars	5
		spaces	" "
		<hr/>	
		ret	null
		num_spaces	1
		num_stars	3
		spaces	" "
		stars	"***"
stack		<hr/>	
		ret	null
		num_spaces	2
		num_stars	1
		spaces	" "
		stars	"*"
		<hr/>	
		ret	null
		n	3
		<hr/>	
heap	repeat	(symbol,n) => ...	
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...	
	draw_pyramid	(n) => ...	

---

















<hr/>		
globals		
	ret	null
	num_spaces	2
	num_stars	1
stack	spaces	" "
	stars	"*"
	<hr/>	
	ret	null
	n	3
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...
<hr/>		
globals		
	ret	" *\n ***\n*****\n"
	num_spaces	2
	num_stars	1
stack	spaces	" "
	stars	"*"
	<hr/>	
	ret	
	n	3
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...
<hr/>		
globals		
	ret	null
stack	n	3
	<hr/>	
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...
<hr/>		



globals		
stack	ret " *\n ***\n*****\n"	
heap	n	3
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...
globals		
stack		
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...
globals		res
stack		
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...
print (" *\n ***\n*****\n")		
globals	res " *\n ***\n*****\n"	
stack		
heap		
	repeat	(symbol,n) => ...
definitions	draw_pyramid_AUX	(num_spaces,num_stars) => ...
	draw_pyramid	(n) => ...
output	" *\n ***\n*****\n"	