Name: _____



Class:			
(1000			
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Workbook v0.9

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	Unit	1
	Racket Code	Pyret Code
	(define AGE 14)	AGE = 14
	(define A-NUMBER 0.6)	A-NUMBER = 0.6
'n	(define SPEED -90)	SPEED = -90
Numbers		Two of your own:
N		
	(define CLASS "Bootstrap")	CLASS = "Bootstrap"
	(define PHRASE "Coding is fun!")	PHRASE = "Coding is fun!"
	(define A-STRING "2500")	A-STRING = "2500"
SS		Two of your own:
Strings		

```
(define SHAPE
                                          SHAPE =
     (triangle 40 "outline" "red"))
                                           triangle(40, "outline", "red")
   (define OUTLINE
                                          OUTLINE =
     (star 80 "solid" "green"))
                                           star(80, "solid", "green")
   (define SQUARE
                                          SQUARE =
     (rectangle 50 50 "solid" "blue"))
                                           rectangle(50, 50, "solid", "blue")
                                                    One of your own:
   (define BOOL true)
                                          BOOL = true
Booleans
   (define BOOL2 false)
                                                    One of your own:
                                         # double : Number -> Number
   ; double : Number -> Number
                                          # Given a number, multiply by
   ; Given a number, multiply by
                                          # 2 to double it
   ; 2 to double it
   (EXAMPLE (double 5) (*
                                  5)
                                          examples:
Functions
   (EXAMPLE (double 7) (*
                                              double(5) is 2 * 5
                                  7))
                                              double(7) is 2 * 7
   (define (double n)
                                  n))
                                          end
                                          fun double(n):
                                              2 * n
                                          end
```

Fast Functions!

Fill out the contract for each function, then try to write two examples and the definition by yourself.

# double :	Number →	Number
examples: double (5) double (7) end	is 2 * 5 n is 2 * 7 n	
fun <u>double</u> (<u>r</u>)	•
2 * n		
end		
#:	>	range
examples:		
() is	
end) is	
fun(()	•
end		

Fast Functions!

Fill out the contract for each function, then try to write two examples and the definition by yourself.

#		•				
·	name		domain		range	
examp	les:					
		_() is		·	
		_() is			
end						
fun _		():		
end						
#	name	:	domain	->	range	
examp	les:					
		_() is			_
end		_() is			_
fun _		():		
— end						

Fast Functions!

Fill out the contract for each function, then try to write two examples and the definition by yourself.

#		:		→		
	name		domain		range	
exa	mples:					
_		() is			
_		() is			
end	l.					
fun	·	():		
end						
<u>C110</u>	<u>ہ</u>					
#		:		>		
#	name	:	domain	>	range	
		:	domain	>	range	
	name	:		>	range	
	name	:	domain) is	>	range	
	name	:) is	>	range	
	mples:	:: (->	range	
exa _ end	mples:	:) is) is		range	
exa _ end	mples:	:: (() is		range	
exa _ end	mples:	:) is) is		range	
exa _ end	mples:	::) is) is		range	

Syntax and Style Bug Hunting: Pyret Edition

```
SECONDS = (7)
#1
     STRING = my string
     SHAPE1 = circle(50 "solid" "blue")
#2
     SHAPE2 = triangle(75, outline, yellow)
     # triple : Number -> Number
     # Multiply a given number by
     # 3 to triple it
#3
     examples:
         triple(5) = 3 * 5
         triple(7) = 3 * 7
     end
     fun triple(n):
#4
         3 * n
     # ys : Number -> Number
     # Given a number, create a solid
     # yellow star of the given size
     examples:
        ys(99) is star(99, "solid", "yellow")
ys(33) is star(99, "solid", "yellow")
#5
     ys(size):
          star(size "solid" "yellow")
     end
```

Unit 2

Word Problem: double-radius

Write a function double-radius, which takes in a radius and a color. It produces an outlined circle of whatever color was passed in, whose radius is twice as big as the input.

ery contr	urpose Statement act has three parts:			
	:		\rightarrow	
name		Domain	Ran	ge
		does the function do?		
e Examp	oles			
	ples of your function in ac	tion		
xampl	.es:			
	()	
	the user types			
	3,			
is				
	which shou	ld become		
	()	
	the user types		/	
	the aser types			
is_				
nd		which should become		
nction	• 11			
	anges in the examples, and de, copying everything that		es where you find varia	bles!
		ion i di di da, di i di da i i gi i di i i		
		1)	•
un		(,	•

Word Problem: double-width

Write a function double-width, which takes in a number (the length of a rectangle) and produces a rectangle whose width is twice the given length.

What does the function do? e Examples te examples of your function in action xamples:		ose Statement			
what does the function do? e Examples re examples of your function in action xamples: () the user types is () the user types is() the user types is() the user types is() the user types is() the user types	ry Confract i	nas inree paris:			
what does the function do? What does the function do? We Examples The user types Is which should become the user types is which should become which should become		•		-	→
What does the function do? We Examples rite examples of your function in action examples:					Range
we Examples rite examples of your function in action examples:					
ve Examples ite examples of your function in action examples:					
ite examples of your function in action examples: (ve Fxamples	Wha	at does the function do)?	
the user types is		of your function in a	ction		
the user types is	xamples	•			
is	-	()	
is		\			
is		the user types			
is	ic				
is	TS	which should become	 me		
is					
is		()	
which should become unction rate the changes in the examples, and name the variables.		the user types			
which should become unction rate the changes in the examples, and name the variables.	•				
unction ircle the changes in the examples, and name the variables.					
rcle the changes in the examples, and name the variables.	end		wnich should become	•	
ircle the changes in the examples, and name the variables.	inction				
		es in the examples, and	d name the variables.		
				names where yo	u find variables!
fun() :	fun		() :
	end				

Word Problem: next-position
Write a function next-position, which takes in two numbers (an x and ycoordinate) and returns a DeliveryState, increasing the x-coordinate by 5 and decreasing the y-coordinate by 5.

ontract+Purpose Stat	ement			
very contract has thre	e parts:			
‡	•		,	
 name	•	 Domain	→	Range
				- 5-
ive Examples	What do	pes the function do?		
rite examples of your	function in action	<u>.</u> 1		
examples:				
L	()	
the user	types			
is				
±5	which should be	ecome		
	,		,	
)	
the us	er types			
is				
end		which should become		
CIIG				
unction				
Circle the changes in the Vrite the code, copying			mas whore you	find variables!
_				
		() :
end				

Data Structure

A CakeType is a flavor, layers, & is-iceCream data CakeType: cake(_____ end To make instances of this structure, I would write: cake1 = _____ cake2 = _____ To access the fields of cake2, I would write:

Word Problem: taller-than

Write a function called *taller-than*, which consumes two CakeTypes, and produces true if the number of layers in the first CakeType is greater than the number of layers in the second.

	oose Statement	
	:	→
ve Examples		
	s of your function in action	
examples	5:	
	()
	the user types	
is		
	which should become	
	()
	the user types	
is		
end	which should be	come
unction		
	ges in the examples, and name the v copying everything that isn't circled,	and using names where you find variables!
rille lille code,		-
fun	(, •

Word Problem: will-melt

Write a function called *will-melt*, which takes in a CakeType and a temperature, and returns true if the temperature is greater than 32 degrees, AND the CakeType is an ice cream cake.

ive Examples If ite examples of your function in action examples: (Contract+Purpose	Statement				
Sive Examples Vrite examples of your function in action examples: (·				
rite examples of your function in action examples:	<u> </u>					
Virite examples of your function in action examples:	Sive Examples					
the user types is		your function in a	action			
the user types is	examples:					
is		()		
the user types is	tł	ne user types				
the user types is	is					
the user types is endwhich should become unction Circle the changes in the examples, and name the variables. Write the code, copying everything that isn't circled, and using names where you find variables		which sho	ould become			
the user types is		()		
unction Circle the changes in the examples, and name the variables. Vrite the code, copying everything that isn't circled, and using names where you find variables				,		
unction Circle the changes in the examples, and name the variables. Write the code, copying everything that isn't circled, and using names where you find variables	is					
Circle the changes in the examples, and name the variables. Vrite the code, copying everything that isn't circled, and using names where you find variables	_		which should	become		
Circle the changes in the examples, and name the variables. Vrite the code, copying everything that isn't circled, and using names where you find variables						
Vrite the code, copying everything that isn't circled, and using names where you find variables		in the examples, an	nd name the variab	oles.		
fun ():					e you find variable	les!
	fun		() :	

end

Vocabulary Practice

Below is a new structure definition:

```
data MediaType:
   book (
      title :: String,
      author :: String,
      pubyear :: Number)
end
# an example book:
book1 = book("1984", "Orwell", 1949)
Fill in the blanks below with the vocabulary term that applies to each
name. Here are the terms to choose from:
          - contract - example
          header - fielddatatype - instance
          - constructor - data block
                    - purpose
          - name
  author is a _____
  book is a _____
  MediaType is a
  book1 is a _____
  title is a _____
  data ... end is a _____
```

Unit 3

Identifying Animation Data Worksheet: Sunset

Draw a sketch for three distinct moments of the animation						
Sketch A	Sketch B	Sketch C				

What things are changing?				
Describe how it changes				

What fields do you need to represent the things that change?					
Field name (dangerX, score, playerIMG)	Datatype (Number, String, Image, Boolean)				

(worksheet continues on the next page)

# a	_State is	
data	State:	
	.(
end)
ena		
Make a sample instanc	ce for each sketch from the previous page:	
=		
=		
		•
=		

Define the Data Structure

Word Problem: draw-state

Write a function called *draw-state*, which takes in a SunsetState and returns an image In which the sun (a circle) appears at the position given in the SunsetState. The sun should be behind the horizon (the ground) once it is low in the sky.

Contract+Purpose Statem	nent				
<pre># draw-state :</pre>				\rightarrow	Image
#					
Write an expression for ec					
while an expression for ec	ich piece or yo				
SUN =					
GROUND =					
SKY =					
Write the draw-state func	tion, using put-i	mage to comb	oine your pieces		
	. 31	<u> </u>	, .		
fun		(_) :

end

Word Problem: next-state-tick

Write a function called *next-state-tick*, which takes in a SunsetState and returns a SunsetState in which the new x-coordinate is 8 pixels larger than in the given SunsetState and the y-coordinate is 4 pixels smaller than in the given SunsetState.

Contract+Purpose	Statement			
#	•		-	
	·			
#				
Give Examples	vour function in as			
Write examples of y	our function in ac	ZIION		
examples:	,		,	
	()	
the	user types			
is				
	which shou	ıld become		
	()	
	he user types			
	,,			
is				
end		which should be	come	
Function				
Circle the changes ir Write the code, copy			s. ing names where you	ı find variables!
		\		
1				
end				

Identifying Animation Data Worksheet

Oraw a sketch for th	nree distinct moments o	f the animation	
Sketch A	A SI	ketch B	Sketch C
What things are cho	anging?	Describe how it ch	nanges
What fields do you r	need to represent the t	hings that change?	
	erX, score, playerIMG)		nber, String, Image, Boolean)

(worksheet continues on the next page)

# a	State is	
data	State:	
	_(
1)
end		
Make a sample insta	nce for each sketch from the previous page:	
_		
=		
		-
=		_

Define the Data Structure

Identifying Animation Data Worksheet

Sketch A		Sketch B	Sketch C
t things are cha	nging?	Describe how	ii ahangaa
Thing		Describe now	ii Changes
t fields do you n	eed to repres	ent the things that chang	ge?
	rX, score, playe	rIMG) Datatype (1	Number, String, Image, Boolean
eld name (dange			
eld name (dange			
eld name (dange			

(worksheet continues on the next page)

# a	State is	
data	State:	
	_(
1)
end		
Make a sample insta	nce for each sketch from the previous page:	
_		
=		
		-
=		_

Define the Data Structure

Identifying Animation Data Worksheet

Draw a sketch for th	nree distinct	moments of the animat	tion
Sketch	A	Sketch B	Sketch C
What things are cho	anging?		
Thing		Describe I	how it changes
What fields do you	need to rep	resent the things that ch	nange?
Field name (dange			rpe (Number, String, Image, Boolean)

(worksheet continues on the next page)

# a	State is	
data	State:	
	(
J)
end		
Make a sample ir	nstance for each sketch from the previous page:	
	=	
	=	
	=	
	=	
	=	

Define the Data Structure

Identifying Animation Data Worksheet

t things are changing? Thing Describe how it changes t fields do you need to represent the things that change?		?	t things are changing?
t things are changing? Thing Describe how it changes t fields do you need to represent the things that change?		?	t things are changing?
It fields do you need to represent the things that change?	cribe how it changes		
t fields do you need to represent the things that change?	cribe now it changes	Describe not	Ining
		Describe nov	· · · · · · · · · · · · · · · · · · ·
at fields do you need to represent the things that change? Patatype (Number, String, Image, Box			l
eld name (dangerX, score, playerIMG) Datatype (Number, String, Image, Boo	at change?	represent the things that char	t fields do you need to
	atatype (Number, String, Image, Boolean	re, playerIMG) Datatype	eld name (dangerX, score

(worksheet continues on the next page)

# a	State is	
data	State:	
	_(
1)
end		
Make a sample insta	nce for each sketch from the previous page:	
_		
=		
		-
=		_

Define the Data Structure

Jnit 4

Word Problem: location

Write a function called *location*, which consumes a DeliveryState, and produces a String representing the location of a box: either "road", "delivery zone", "house", or "air".

Cont	ract+Purpose Statement		
#	·	→	
#			
Give	Examples		
ex	amples:		
	() is	
	() is	
-	() is	
	() is	

end

(worksheet continues next page)

Function fun		()	:
	if		 		_:
					_:
	else if				_: _:
	else: _				_
end	end				

S	Syntax and Style Bug Huntin	g: Piecewise Edition
	Buggy Code	Correct Code / Explanation
Round 1	<pre>fun piecewisefun(n): if (n > 0): n else: 0</pre>	
Round 2	<pre>fun cost(topping): if string-equal(topping, "pepperoni"): 10.50 else string-equal(topping, "cheese"): 9.00 else string-equal(topping, "chicken"): 11.25 else string-equal(topping, "broccoli"): 10.25 else: "That's not on the menu!" end end</pre>	
Round 3	<pre>fun absolute-value(a b): if a > b: a - b b - a end end</pre>	
Round 4	<pre>fun best-function(f): if string-equal(f, "blue"): "you win!" else if string-equal(f, "blue"): "you lose!" else if string-equal(f, "red"): "Try again!" else: "Invalid entry!" end end</pre>	

Animation Extension Worksheet

Describe the goal of your change: what new feature or behavior will it add to your animation?

Draw a sketch	for three distinc	t moments of t	he animation			
Sketo	ch A	Ske	etch B	Sketch	С	
What things are	e chanaina?					
Thing	9 01101191119		Describe how it ch	anges		
	you need to re langerX, score, p		ngs that change? Datatype (Num	ber, String, Image, Bo	oolean.)
(0						,
Make a To Do I	list and check	off each as "D	one" when you fir	oish each one		
Component Component		work to be dor			To-Do	Done
Data Structure	If any new field	f any new field(s) were added, changed or removed				
draw-state	If something is displayed in a new way or position					
next-state-tick	If the Data Stru	If the Data Structure changed, or the animation happens automatically				
next-state-key	If the Data Stru	f the Data Structure changed, or a keypress triggers the animation				
reactor	If either next-sto	ate function is ne	°W			

Make a sample insta	ance for each ske	etch from the pr	evious page:		
=					
=	·				
=	=				
Write at least one N	EW example for c	one of the funct	ons on your To-	-Do list	
If you have another	function on your	To-Do list , write	at least one N	EW example	

Word Problem: draw-sun

Write a function called *draw-sun*, which consumes a SunsetState, and produces an image of a sun (a solid, 25 pixel circle), whose color is "yellow", when the sun's y-coordinate is greater than 225, "orange", when its y-coordinate is between 150 and 225, and "red" otherwise.

Contract+Purpose	Statement		
#	:		→
#			
Give Examples			
examples:			
	() is	
	() is	
	() is	
end			

(worksheet continues next page)

Funct	tion		
fur	n	() :
	if		:
	else if		:
	else:		
	end		
end			

Unit 5	

Describe the goal of your change: what new feature or behavior will it add to your animation?

Decrease the cat's hunger level by 2 and sleep level by 1 on each tick.

Draw a sketch for three distin	ct moments of the animation, foc	cusing on the new behavior
HINGE: SLEEP:	HUNGER. SLEEP:	HUNGE: SLEEP:
Sketch A	Sketch B	Sketch C

What things are changing?						
Describe how it changes						

What fields do you need to represent the things that change?					
Field name (dangerX, score, playerIMG)	Datatype (Number, String, Image, Boolean)				

Make a To-Do List, and check off each as "Done" when you finish each one.						
Component	When is there work to be done?	To-Do	Done			
Data Structure	If any new field(s) were added, changed or removed					
draw-state	If something is displayed in a new way or position	V				
next-state-tick	If the Data Structure changed, or the animation happens automatically					
next-state-key	If the Data Structure changed, or a keypress triggers the animation					
reactor	If either next-state function is new					

Make a sample instance for each sketch from the previous page:
FULLPET = $pet(100, 100)$
MIDPET = $pet(50, 75)$
$LOSEPET = \underline{pet(0, 0)}$
Write at least one NEW example for one of the functions on your To-Do list
next-state-tick(FULLPET) is pet(FULLPET.hunger - 2, FULLPET.sleep -
next-state-tick(MIDPET) is pet(MIDPET.hunger - 2, MIDPET.sleep - 1)
next-state-tick(LOSEPET) is LOSEPET
If you have another function on your To-Do list , write at least one NEW example

Draw a sketch	for three distinc	t moments of t	the animation			
Sketo	ch A	Ske	etch B	Sketch	С	
What things are	e changing?					
Thing			Describe how it ch	anges		
	you need to re langerX, score, p		ngs that change?	ber, String, Image, Bo	oolean	1
Tield fidille (c	idi 1901X, 30010, p	nayonivio	Daidiype (Nom	501, 31111g, 1111age, 50	olodii.	•••
Make a 10-Do l Component		off each as "D work to be do	one" when you fir		To-Do	Done
Data Structure			changed or remove	ed		
draw-state	If something is a	displayed in a ne	ew way or position			
next-state-tick	If the Data Stru	cture changed,	or the animation ha	ppens automatically		
next-state-key	If the Data Stru	cture changed,	or a keypress trigger	rs the animation		
reactor	If either next-sto	ate function is ne	ew			

	e instance fo	r each sketcl	h from the prev	ious page:		
	_ =					
	_ =					
	_ =					
te at least a	ne NEW eva	imple for one	of the function	os on vour Io-D	○ list	
ie di ledsi c	HE NEW EXO	mple for one	Of the folicitor	13 OTT YOUT TO-D	O IIST	
ou have an	other functio	n on your To-	Do list , write a	least one NEV	V example	
ou have an	other functio	n on your To-	Do list , write a	t least one NEV	V example	
ou have and	other functio	n on your To-	Do list , write a	t least one NEV	V example	
ou have and	other functio	n on your To-	Do list , write a	t least one NEV	V example	
ou have and	other functio	n on your To-	Do list , write a	t least one NEV	V example	
ou have and	other functio	n on your To-	Do list , write a	t least one NEV	V example	
ou have and	other functio	on on your To-	Do list , write a	t least one NEV	V example	
ou have and	other functio	on on your To-	Do list , write a	t least one NEV	V example	
ou have and	other functio	on on your To-	Do list , write a	least one NEV	V example	
ou have an	other functio	on on your To-	Do list , write a	t least one NEV	V example	

Draw a sketch	for three distinc	t moments of the animation		
Sketo	ch Δ	Sketch B Sketch	\overline{C}	
JKCI		SKCICII D SKCICII	C	
What things are	e changing?			
Thing		Describe how it changes		
What fields do	you need to re	present the things that change?		
	langerX, score, p		olean.)
Make a To-Do I	ist, and check	off each as "Done" when you finish each one.		
Component	When is there	work to be done?	To-Do	Done
Data Structure	If any new field	(s) were added, changed or removed		
draw-state	If something is a	displayed in a new way or position		
next-state-tick	If the Data Struc	cture changed, or the animation happens automatically		
next-state-key	If the Data Struc	cture changed, or a keypress triggers the animation		
reactor	If either next-sto	ate function is new		

						vious p	age.			
					'	1				
	= _									
	_ =								_	
	_ =								_	
		_								
te at least on	ne NEV	√ examp	ole for o	ne of th	e functio	ons on y	our To-D	o list		
ou have and	ther fu	unction o	on vour	To-Do lis	t write	nt least	one NFV	V examn	le.	
ou have ano	ther fu	unction (on your	To-Do lis	t , write (at least	one NEV	V examp	le	
ou have ano	ther fu	unction o	on your	To-Do lis	t , write (at least	one NEV	V examp	le	
ou have ano	ther fu	inction (on your	To-Do lis	t , write (at least	one NEV	V examp	le	
ou have ano	ther fu	unction (on your	To-Do lis	t , write (at least	one NEV	V examp	le	
ou have ano	ther fu	inction c	on your	To-Do lis	t , write (at least	one NEV	V examp	le	
ou have ano	ther fu	unction (on your	To-Do lis	t , write (at least	one NEV	V examp	le	
ou have ano	ther fu	inction o	on your	To-Do lis	t , write (at least	one NEV	V examp	le	
ou have ano	ther fu	inction (on your	To-Do lis	t , write o	at least	one NEV	V examp	le	
ou have ano	ther fu	unction o	on your	To-Do lis	t , write (at least	one NEV	V examp	le	

Build Your Own Animation

Draw a sketch	for three distinc	t moments of the animation		
Clast	- l- A	Chatala D		
Sket	Ch A	Sketch B Sketch	<u></u>	
What things are Thing	e changing?	Describe how it changes		
9				
What fields do	you need to re	oresent the things that change?		
Field name (c	dangerX, score, p	playerIMG) Datatype (Number, String, Image, Bo	olean.)
Make a To-Do I Component		off each as "Done" when you finish each one. work to be done?	To-Do	Done
Data Structure		(s) were added, changed or removed	П	П
draw-state	If something is c	displayed in a new way or position		
next-state-tick	If the Data Struc	cture changed, or the animation happens automatically		
next-state-key	If the Data Struc	cture changed, or a keypress triggers the animation		
reactor	If either next-sto	ate function is new		

	State is	
a	State:	
	(
)
	ance for each sketch from the previous pa	
=		
=		
=		
=		

Collision

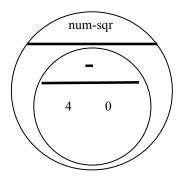
Distance:

The Player is at (4, 2) and the Target is at (0, 5). Distance takes in the player's x, player's y, character's x and character's y.

Use the formula below to fill in the EXAMPLE:

$$\sqrt{(4-0)^2+(2-5)^2}$$

Convert it into a Circle of Evaluation. (We've already gotten you started!)



Convert it into Pyret code:

Word Problem: distance Write a function distance, which takes FOUR inputs: \Box px: The x-coordinate of the player □ py: The y-coordinate of the player □ cx: The x-coordinate of another game character ☐ cy: The y-coordinate of another game character It should return the distance between the two, using the Distance formula: Distance² = $(px - cx)^2 + (py - cy)^2$ Contract+Purpose Statement #_____:___-> _____ Give Examples Write examples of your function in action examples: is end Function fun _____(___):

end

Write a function is-collision, which takes FOUR inputs: ■ px: The x-coordinate of the player py: The y-coordinate of the player □ cx: The x-coordinate of another game character □ cy: The y-coordinate of another game character It should return true if the coordinates of the player are within 50 pixels of the coordinates of the other character. Otherwise, false. Contract+Purpose Statement #_____->____ Give Examples Write examples of your function in action examples: end Function fun _____(____):

end

Word Problem: is-collision

DESIGN RECIPE

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Circle the changes in the examples	s, and name the variables.	
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DESIGN RECIPE

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Draw a sketch	for three distinc	t moments of the animation		
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Component			To-Do	Done
Data Structure	If any new field	(s) were added, changed or removed		
draw-state	If something is c	displayed in a new way or position		
next-state-tick	If the Data Struc	cture changed, or the animation happens automatically		
next-state-key	If the Data Struc	cture changed, or a keypress triggers the animation		
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Contracts

example																		
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Contracts

Domain Range example	*	•	•	•	*	*	•	*	*	· ·	· ·		↑	*	*	*	· ::	•
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