Name: _____



BOOTSTRAP: 2

www.bootstrapworld.org

Class:



Workbook v1.0

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Lesson 1

	Racket Code	Pyret Code
	(define AGE 14)	AGE = 14
	(define A-NUMBER 0.6)	A-NUMBER = 0.6
8	(define SPEED -90)	SPEED = -90
Numbers		Two of your own:
	(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) (* 2
                                              double(5) is 2 * 5
                                  7))
                                              double(7) is 2 * 7
    (define (double n) (*
                                          end
                                  n))
                                          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.

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

Fast Functions!

Fill out the contract for each functior	n, then try to wr	rite two examples	and the definition	n by y	ourself

ш					
#	;	domain	->	range	_
examples:					
	() is			
	() is			
end					
fun	():		
end					
#			>		
name		domain		range	
examples:					
	() is			
	() is			
end					
fun	():		
end					

Fast Functions!

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

#	:_		> _		
name		doma	in	range	
examples:					
	() is			
	() is _			
end					
fun	():		
end					
#	:	doma	-> _	rango	
name		doma	111	range	
examples:					
	() is			
	() is _			
end					
fun	():		
fun	():		
fun	():		

	Bug Hunting: Py	ret Edition
#1	SECONDS = (7) STRING = my string	
#2	SHAPE1 = circle(50 "solid" "blue")	
	SHAPE2 = triangle(75, outline, yellow)	
#3	<pre># triple : Number -> Number # Multiply a given number by # 3 to triple it examples: triple(5) = 3 * 5 triple(7) = 3 * 7 end</pre>	
#4	fun triple(n): 3 * n	
#5	<pre># 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") ys(size): star(size "solid" "yellow") end</pre>	

Lesson 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.

Contract	t+Purpose Statement			
Every co	ntract has three parts:			
#	:		_	>
	me	Domain		Range
#				
"		at does the function do	?	
Give Exar	mples			
	amples of your function in a	ction		
exami	oles:			
_	()	is	
	the user types	,		
	which show	uld become		
_	(the user types)	is	
	the deer typesiii			
	wh	nich should become		
end	WII	nch should become		
Function Circle the	changes in the examples, and	d name the variables.		
Write the	code, copying everything that	t isn't circled, and using no	ames where you	find variables!
fun _	(_):	
			•	
_				
end				

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.

Examples examples of your function in action emples: (the user types	omain function do	is	Range
Examples e examples of your function in action amples:	function do		
Examples e examples of your function in action amples:	function do		
the user typeswhich should become)	is	
te examples of your function in action camples:)	is	
which should become)	is	
the user typeswhich should become)	is	
which should become)	1S	
which should become			
(
(
	`		
the user types)	is	
the user types			
which should beco	ome		
nd			
nction			
rcle the changes in the examples, and name the v		ana an tula ara tratt	المالمة أعلم ما
ite the code, copying everything that isn't circled,	and using n	iames where you ii	na vanabi
un (

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

	t+Purpose Statement			
every co	ntract has three parts:			
#	:		_	->
	 me	Domain		Range
ш				
#		at does the function d		
	Wild	te does the function d		
Give Exar		1*		
Write exc	amples of your function in a	CTION		
exam	ples:			
	()	is	
_	the user types	·····/	15	
	which show	uld become		
	1	`		
_	(the user types)	is	
	the user types			
-	wh	nich should become		
end				
Function				
Circle the	changes in the examples, and			
Write the	code, copying everything that	t isn't circled, and using	names where you	find variables!
fun	() •	
Luii .	\\\		/·	
and -				

Data Structure

A CakeT is a flavor, layers, & is-iceCream
data CakeT:
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 CakeTs, and produces true if the number of layers in the first CakeT is greater than the number of layers in the second

Contro	act+Purpose Statement		
#	:		
#			
	kamples		
exam	ples:		
		is	
		is	
end			
Functio	on		
fun	():	
end			

Word Problem: will-melt

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

Contro	act+Purpose Statement				
#	:			->	
#					
Give Ex	camples ples:				
	()	is		
)	is		
end Functio					
	(_):		
end					

Lesson 3

Animation Design Worksheet

Draw a sketch for three distinct moments of the animation

		2.6 6.6.6.6				
	Sketch A	Sk	cetch B		Sketch C	
Vhat thin	gs are changing?					
	ing	How does it chan	ige?		Does it change con	sistently?
Mara L. Carla			1 - 1 0			
		represent the things that score, playerIMG)		pe (Number,	String, Image, Boole	an)
Circle t	he items held	ow that you will n	eed to writ	te or edit	Check them	off
	ou finish eac	•		io oi odii.		711
	Sample inst	ances				
	draw-stat	e :	-> I	mage		
		e-tick :				
		e-key :				
	reactor					

Data Structures

# a	State is a
data	State:
I	
)
end	•
Make three s	ample instances that represent the <u>sketches</u> from the
orevious pag	e:
	A =
	в =
	c =
Write an exc	imple for one of the functions on the previous page:

Animation Design Worksheet

Draw a sketch for three distinct moments of the animation

	Sketch A	Sketch B	Sketch C
Vhat thin	gs are changing?		
Th	ning H	low does it change?	Does it change consistently?
Vhat field	ds do vou need to represe	nt the things that change?	
	name (dangerX, score, p		ype (Number, String, Image, Boolean)
	the items below the	at you will need to wr	rite or edit. Check them off
	Sample instance	S	
	draw-state :		Image
	next-state-tio	ck :	>
			, String ->
	reactor		

Data Structures

# a	State is a
data	State:
[
)
end	
Make three orevious pa	sample instances that represent the sketches from the ge:
	_A =
	_B =
	_c =
Write an ex	ample for one of the functions on the previous page:

Animation Design Worksheet

Draw a sketch for three distinct moments of the animation

	Sketch A	Ske	etch B		Sketch C
	gs are changing? ning	How does it chang	je?		Does it change consistently?
Vhat field	ds do vou need to re	present the things that	change?		
	d name (dangerX, sc			pe (Num	ber, String, Image, Boolean)
	the items belov	<u>-</u>	ed to writ	te or e	edit. Check them off
	Sample insta	nces			
	draw-state	:	> I	mage	
		-tick :			
	next-state	-key :			.ng ->
	reactor				

Data Structures

# a	State is a
data	State:
1	
end	•
Make three s	ample instances that represent the <u>sketches</u> from the
orevious pag	e:
	A =
	в =
	c =
	C –
Write an exa	mple for one of the functions on the previous page:

Animation Design Worksheet

Draw a sketch for three distinct moments of the animation

	Sketch A	Ske	tch B	Sketch C	
Vhat thin	gs are changing?				
	ning	How does it change	?	Does it change consis	tently?
Vhat field	ds do you need to rep	resent the things that c	change?		
Field	I name (dangerX, sco	re, playerIMG)	Datatyp	pe (Number, String, Image, Boolean)
	the items below you finish each.	that you will ne	ed to writ	te or edit. Check them off	
	Sample instan	ices			
	draw-state	:	> I	mage	
				_>	
				String ->	
	reactor				

Data Structures

# a	State is a
data	State:
I	
end	
Make three	sample instances that represent the sketches from the
orevious pa	
	_A =
	_B =
	_c =
Write an ex	ample for one of the functions on the previous page:

Lesson 4

Word Problem: location

Write a function called *location*, which consumes a JumperState, and produces a String representing the jumper's location: either "cliff", "beach", "water", or "air".

Con	tract+Purpose State	ement				
# _		:			>	
# _						
Give	Examples mples:					
		()	is		_
		()	is		
		()	is		_
		()	is		

end

Function

fun			():	
	if _				
	else i	.f			:
		-			
	else i	.f			:
	else:				
	end				
end					

Piecewise Bug-Hunting

	Ruggy Codo	Correct Code / Evalaination
Round 1	<pre>fun piecewisefun(n): if (n > 0): n else: 0</pre>	Correct Code / Explaination
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>	
Round 5	<pre>fun my-function(x): if (4 < 8): x else: x * 2 end end</pre>	

Word Problem: sun-color

Write a function called *sun-color*, 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.

Contra	ct+Purpose State	ement			
#		:			->
#					
Give Exc examp					
_		()	is	
_		()	is	
		()	is	
_		()	is	
end					

Function

fun			():
	if _			
	else i	.f		:
	else i	.f		:
	_			
	else:			
	end			
end				

Lesson 5

Word Problem: red-shape

Write a function *red-shape*, which takes in the name of a shape (such as "circle", "triangle", "star", or "rectangle"), and draws that solid, red shape. Use 50 as the radius of the circle and star, and side-length of the triangle. Make the rectangle 99 pixels long by 9 wide.

#	<u>:</u>	->
#		
examples:		
	() is	
end		
Function		
ask:		
	<u> </u>	tnen:
	<u> </u>	then:
		then:
	l <u></u>	then:
		
end		

30

end

Word Problem: strong-password

Websites have strict password requirements. Write a function strong-password, which takes in a username and password, and checks to make sure they aren't the same, and then checks the string-length of the password to make sure it is greater than 8 characters. The function should return a message to the user letting them know if their password is strong enough.

#			:			->		
#								
Civo F	Example	\						
	nples							
				() i	.S	
				() i	. S	
				() i	.S	
end								
Functi fun	on		():			
Luii	ask:	1			/·			then:
		ı						+ h o n •
		ı						
end	end	I	otherwise:_		 			

Building Your Helper Functions

# is-off-right	: :	->	
examples:			
	() is	
	() is	
end			
fun	():	
end			
# is-off-left	:	->	
examples:			
-	() is	
	·		
•	() is	
end			
	(
end fun	():	

Word Problem: line-length

Write a function called *line-length*, which takes in two numbers and returns the difference between them. It should always subtract the smaller number from the bigger one.

		_ :				>	
							
ve Exa	mples						
xam	ples:						
_		()	is		
_							
_		()	is		
nd							
	Header						
nction			() :	:	
nction			(variable r		:	
nction un			(:	
nction un	function name		(:	
nction un	function name		(:	
nction un	function name		(:	
un	function name		(•	
nction un	function name		(
nction un	function name						
nction un	function name						

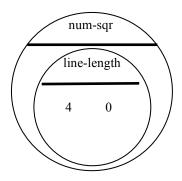
Distance:

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:

$$\sqrt{\left(line-length \;\; 4 \;\;\; 0\;\right)^{\;2} \;\; + \; \left(line-length \;\; 2 \;\;\; 5\;\right)^{\;2}}$$

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:

□ 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 = $(line-length px cx)^2 + (line-length py cy)^2)$

Contro	act+Purpose St	atement					
						>	
Give Ex	camples examples of yo						
exa	mples:	()	is		
		()	is		
end							
function	on 		():		

end

Word Problem: is-collision Write a function is-collision, which takes FOUR inputs:

cx: Th cy: Th It show coord	ne y-coordinate outlined the second s	of another game choof another game choof the coordinates of the her character. Othe	aracter le player are withi	n 50 pixels of	f the
Contract+Pu	urpose Statemer	t			
#	·			>	
#					
Give Example Write examp	es oles of your funct	ion in action			
exampl	es:	()	is
		(_5
		()	is
end					
Function					
fun		():		
end					

Using Helpers inside next-world:

How does the World structure change when...?

TEST		RESULT	
	world(_		
)
	world(_		
)
	world(_		
)
	world(_		
)
			,

Supplemental

DESIGN RECIPE

Contrac	ct+Purpose Statement				
Every co	ontract has three parts:				
#	•				
	• • ame	 Doma		> Range	
ш				, , , , , , , , , , , , , , , , , , ,	
#	N/L	at does the function			
		at does the function	1 00?		
Give Exa	mples amples of your function in a	ction			
VVIIIC CX		CHOH			
exam	ples:				
_	()	is		
	the user types				
	which sho	ould become			
_	()	is		
	the user types				
1	wl	nich should become			
end					
Function					
Circle the	e changes in the examples, an	d name the vari	ables.		
fun):		
_					
end					

DESIGN RECIPE

Contract+	-Purpose Statement				
Every con	tract has three parts:				
#	•			->	
π nam	•e	Dom	ain	Range	
ш					
#		nat does the function			
		iat does the function	on do:		
Give Exam	ples				
write exar	mples of your function in c	ICTION			
examp	les:				
I	()	is		
	the user types	/			
	which sho	ould become			
	()	is		
	the user types				
	w	hich should become			
end		men should become	-		
Function Circle the	changes in the examples, ar	ad name the var	iables		
Circle irie	changes in the examples, ar	ia riame ine vai	idbics.		
fun _	():		
end					

Contracts

Name	Domain	Range	example
#		→	
#		→	
#		→	
#		→	
#		→	
#		→	
#		→	
#		→	
#		→	
#		→	
#		→	
#		→	
#		→	
#		→	
#		→	
#		→	
#		→	
#		•	

Contracts

Name	Domain	Range	example
#		→	
#	•	→	
#	•	→	
#		→	
#	:	→	
#		→	
#	:	→	
#		→	
#	:	→	