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

```
(define SHAPE
                                         SHAPE =
     (triangle 40 "outline" "red"))
                                           triangle(40, "outline", "red")
   (define OUTLINE
                                         OUTLINE =
     (star 80 "solid" "green"))
                                           star(80, "solid", "green")
                                         SQUARE =
   (define 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:
   (EXAMPLE (double 7) (* 2
                                 7))
                                             double(5) is 2 * 5
                                             double(7) is 2 * 7
   (define (double n) (* 2 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 name	::	Numbe	er	Number
exar — end	double (5 n 7 n	±5	2 * 5 n 2 * 7	
fun	double	(<u> </u>):	
end	2 * n				
#	name	::	domain	->	range
exar	mples:				
		.(_) 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.

Fast Functions!

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

#	••		→	
name	··	domain	/	range
examples:				
	(\ ic		
	(
	() is		
end				
fun	():	
			·	
end				
#	·•		>	
#	::	domain	->	range
#	::	domain	->	range
#	::			
#	·•		->	
#	·•			
#	·•) is		
#name examples:	(() is		
#name examples: end	(() is		

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
     examples:
#3
         triple(5) = 3 * 5
         triple(7) = 3 * 7
     end
     fun triple(n):
         3 * n
#4
     # 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.

name • •	Domain		Range
	What does the function do?		
camples .			
xamples of your fund	ction in action		
mples:			
	()	
the user type	es		
•	which should become		
	()	
the user types			
: a			
LS	which should become		
n			
	mples, and name the variables. ything that isn't circled, and using nar	mes where voi	ı find variablesl
s code, copying ever	yriirig iriar isrri circica, aria osirig riar	rics writere you	o iiria variabies:
	() :

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? Examples e examples of your function in action kamples:	name	· ·	 Domain		_ → Range
what does the function do? Examples e examples of your function in action camples:	Tranic		Domain		Range
the user types is					
the examples of your function in action xamples:		What	does the function do	0?	
the user types is	e Examples				
the user types is			on		
the user types which should become	xamples	:			
is		()	
is		the user types			
is		,			
the user types is	is				
the user types is		which should become			
the user types is		()	
which should become nction rcle the changes in the examples, and name the variables. rite the code, copying everything that isn't circled, and using names where you find variables.					
nction rcle the changes in the examples, and name the variables. rite the code, copying everything that isn't circled, and using names where you find variables.					
nction rcle the changes in the examples, and name the variables. rite the code, copying everything that isn't circled, and using names where you find variables.	is				
rcle the changes in the examples, and name the variables. ite the code, copying everything that isn't circled, and using names where you find varial			which should become	е	
rcle the changes in the examples, and name the variables. rite the code, copying everything that isn't circled, and using names where you find varial					
ite the code, copying everything that isn't circled, and using names where you find varial		es in the examples and n	name the variables		
_				names where yo	ou find variable:
fun() :	fun		() :

Word Problem: next-position

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

Contract+Purpose Statement

name	• •	 Domain	→ R ange
name		DOMAIN	Range
	What	does the function do?	
ve Examples	of your function in action	on	
xamples	•	JII	
xampres	4	,	
	()	
	the user types		
is			
	which should	become	
	()
	the user types		
is			
end		which should become	
nction			
	es in the examples, and n	ame the variables.	
ite the code, o	copying everything that isr	n't circled, and using names wh	nere you find variables!
		() :
iun			

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.

priliaci i roit	pose Statement	
	::	
ive Example:		
-	es of your function in action	
example	•	
	()
	the user types	
is		
	which should become	
	()
	the user types	·
is		
end	which should be	ecome
unction ircle the chan	ges in the examples, and name the v	variables
		, and using names where you find variables!
fun	(
end		

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.

Contract+Purpo	se Statement		
#	::		÷
‡			
Give Examples			
•	of your function in action		
examples			
	()	
	the user types		
is	which should become		
	which should become		
	()	
	the user types		
ic			
end	which	should become	
ena			
unction			
	es in the examples, and name the		
	opying everything that isn't circled		
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 - field
           datatype- instance- data block
           - name

    purpose

  author is a
  book is a ____
  MediaType is a _____
  book1 is a _____
```

data ... end is a _____

title is a _____

Unit 3

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

What things are changing?			
Thing	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)	

Define the Data Struc	ture	
# a		
data	State:	
l	_(
end)	
Make a sample instar	nce for each sketch from the previous page:	
=		

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 Stateme		\ -
# draw-state :	:	→ Image
	ch piece of your final image	
те ап ехргеззюттог еас	in piece or your linar image	
SUN =		
GROUND =		
SKY =		
rite the draw-state functi	on, using put-image to combine y	our pieces
	,	
fun	() :

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+Purpos	se statement			
:	::			
ve Examples				
•	of your function in action			
examples:	1			
	()	
	the user types			
is				
	which should becor	ne		
	()	
	the user types		/	
is				
end	٧	vhich should become		
nction		He a constant to a		
	s in the examples, and name ppying everything that isn't cir		es where you find yo	ıriables!
		_	•	•
			<i>'</i>	•
_				
end				

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

Describe how it changes
Describe flow if changes

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

Define the Data Structu	re	
# a	_State is	_
data	State:	
	(_
		_
		_
end	,	.)
ena		
Make a sample instanc	e for each sketch from the previous page:	
_		
_		

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)	

Define the Data Struct	Ira	
Deline the Data shock	JI E	
# a	_State is	-
data	State:	
	.(_
		_
		·)
end	•	,
Make a sample instanc	ce for each sketch from the previous page:	
= _		
=		

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

Vhat things are changing?	
Thing	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)				

Define the Data Structu	ıre	
# a	_State is	_
data	State:	
	(_
_		_)
end		
Make a sample instanc	e for each sketch from the previous page:	
make a sample installe	o ter oderrakorem mem me providos pago.	
= _		

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

What things are changing?					
Thing	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)				

Define the Data Struct	ture	
# a		_
data	State:	
1		_
		_
		_
end		_)
ena		
Make a sample instan	ce for each sketch from the previous page:	
_		
= _		

Unit 4

Functio	on				
fun		 (_)	:
	if	 	 		_ :
	else if				•
	else if				_:
	else: _				_
end	end				

Syntax and Style Bug Hunting: Piecewise Edition **Buggy Code** Correct Code / Explanation fun piecewisefun(n): **if** (n > 0): n else: 0 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 fun absolute-value(a b): Round 3 if a > b: a - bb - a end end 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

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	the animation			
Sketo	ch A	Ske	etch B	Sketch	C	
		0		J. G.		
What things are Thing	e changing?		Describe how it ch	anaes		
IIIIIg			Describe now ii ch	luliges		
			ngs that change?			
Field name (c	dangerX, score, p	olayerIMG)	Datatype (Num	nber, String, Image, Bo	oolean.)
Make a Te De l	ist and shock	off agab as "F	one" when you fir	aich agab ana		
Component		work to be do			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					
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-sto	ate function is ne	ew			

A A silva en a sussible à	inakana a faranaha	يري حالم ويرين		
Make a sample l	instance for each sl	ketch trom the pr	evious page:	
	=			
				
	=			
	=			
Write at least on	e NEW example for	one of the functi	ons on your To-Do	list
	'		<i>'</i>	
				· · · · · · · · · · · · · · · · · · ·
				· · · · · · · · · · · · · · · · · · ·
If you have anot	her function on you	ır To Do list verito	at loast one NEW	evemple
ir you have anoi	ner function on you	ii 10-D0 iisi , wiile	ar least one new	ехатріе

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

Unit 5

Animation Extension Worksheet

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 distinct moments of the animation, focusing on the new behavior

HUNGER
SLEEP:
SLEE

Sketch A Sketch B Sketch C

What things are changing?				
Thing	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?		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 sampl	e instance for each sketch from the previous page:
FULLPET = _	pet(100, 100)
MIDPET =	pet(50, 75)
LOSEPET =	pet(0, 0)
Write at least o	one NEW example for one of the functions on your To-Do list
next-state-1	tick(FULLPET) is pet(FULLPET.hunger - 2, FULLPET.sleep - 1
next-state-	tick(MIDPET) is pet(MIDPET.hunger - 2, MIDPET.sleep - 1)
next-state	-tick(LOSEPET) is LOSEPET
	· · · · · · · · · · · · · · · · · · ·
It you have an	other function on your To-Do list , write at least one NEW example

Draw a sketch	for three distinc	t moments of	the animation			
Sketo	ch A	Ske	etch B	Sketch	C	
		0		J. G.		
What things are Thing	e changing?		Describe how it ch	anaes		
IIIIIg			Describe now ii ch	luliges		
			ngs that change?			
Field name (c	dangerX, score, p	olayerIMG)	Datatype (Num	nber, String, Image, Bo	oolean.)
Make a Te De l	ist and shock	off agab as "F	one" when you fir	aich agab ana		
Component		work to be do			To-Do	Done
Data Structure			, changed or remove		_	_
	in arry mere winera	15) Were daded	- Changea of Temov			
draw-state	If something is a	displayed in a ne	ew way or position			
next-state-tick	If the Data Structure changed, or the animation happens automatically \Box					
next-state-key	If the Data Structure changed, or a keypress triggers the animation					
reactor	If either next-sto	ate function is ne	ew			

reactor	If either next-state function is new	
Make a sampl	e instance for each sketch from the previous page:	
	_ =	
Write at least o	one NEW example for one of the functions on your To-Do list	
If you have an	other function on your To-Do list , write at least one NEW example	

Draw a sketch	for three distinc	t moments of	the animation			
Sketo	ch A	Ske	etch B	Sketch	C	
		0		J. G.		
What things are Thing	e changing?		Describe how it ch	anaes		
IIIIIg			Describe now ii ch	luliges		
			ngs that change?			
Field name (c	dangerX, score, p	olayerIMG)	Datatype (Num	nber, String, Image, Bo	oolean.)
Make a Te De l	ist and shock	off agab as "F	one" when you fir	aich agab ana		
Component		work to be do			To-Do	Done
Data Structure			, changed or remove		_	_
	in arry mere winera	15) Were daded	- Changea of Temov			
draw-state	If something is a	displayed in a ne	ew way or position			
next-state-tick	If the Data Structure changed, or the animation happens automatically \Box					
next-state-key	If the Data Structure changed, or a keypress triggers the animation					
reactor	If either next-sto	ate function is ne	ew			

A A silva en a sussible à	inakawa a farra wala al	يرم المام الم		
Make a sample l	instance for each sk	ketch from the pre	evious page:	
	=			
				
	=			
				
	=			
				
Write at least on	e NEW example for	one of the function	ons on your To-Do li	st
	'		,	
				· · · · · · · · · · · · · · · · · · ·
If you have anot	her function on you	ır To Do list write	at loast one NEW o	vample
ir you have anoi	ner fonction on you	ii 10-D0 iisi , wiile	ar least one new e	хаттріе

Build Your Own Animation	

Draw a sketch	for three distinc	t moments of	the animation			
Sket	ch A	Ske	etch B	Sketch	С	
What things are	e changing?					
Thing		[Describe how it chan	ges		
	you need to re langerX, score, p		ngs that change? Datatype (Num	ber, String, Image, Bo	polean.)
(0						,
Make a To-Do I	ist, and check	off each as "D	Oone'' when you fir	nish each one.		
Component	When is there				To-Do	Done
Data Structure	If any new field	(s) were added	, changed or remove	ed		
draw-state	If something is o	displayed in a ne	ew way or position			
next-state-tick	If the Data Struc	cture changed,	or the animation ha	ppens automatically		
next-state-key	If the Data Struc	cture changed,	or a keypress trigger	s the animation		
reactor	If either next-state function is new					

Define the Data S	tructure	
# a	State is	
data	State:	
	(
-)
end		
Make a sample ir	stance for each sketch from the previ	ious page:
	=	
	=	
	=	
Write an example	for one of the functions on the previo	ous page:
		· · · · · · · · · · · · · · · · · · ·
		· · · · · · · · · · · · · · · · · · ·

Collision

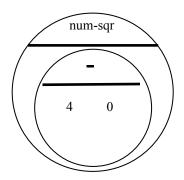
Distance:

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:

□ py: Tl□ cx: Tl	The x-coordinate of the player The y-coordinate of the player The x-coordinate of another gar			
-	he y-coordinate of another gar			
It should reti	urn the distance between the	two, using the Distan	ce formula:	
	Distance ² =	$= (px - cx)^2 + (py$	- cy) ²	
Contract+P	urpose Statement			
#	••		>	
#				
Give Examp				
Write examp	ples of your function in actio	n		
exampl	es:			
	()		
is				
	()		
is				
end				
Function				
fun			.):	
end				

	Word Problem: is-collision
	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
Cont	ract+Purpose Statement
#	>
	Examples examples of your function in action
exa	amples:()
	is
	(
	is

end Function

fun

end

	Word Problem: is-collision
	Write a function is-collision, which takes FOUR inputs:
	py: The y-coordinate of the player
	and the x doct and the garrie drian doctor
	It should return true if the coordinates of the player are within 50 pixels of the
Cont	coordinates of the other character. Otherwise, false. ract+Purpose Statement
#	••
#	
Give	Examples
Write	examples of your function in action
exa	amples:
	(
	is
	is
	is

end Function

fun

end

Build Your Own Animation	

Draw a sketch	for three distinc	t moments of the animation		
Sket	ch A	Sketch B Sketch	С	
What things are	e changing?	Describe how it shanges		
Thing		Describe how it changes		
	·	present the things that change?		
Field name (c	dangerX, score, p	Datatype (Number, String, Image, Bo	olean.)
Make a To-Do I	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 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		

Build Your Own Animation	

Draw a sketch	for three distinc	t moments of	the animation			
Sket	ch A	Ske	etch B	Sketch	С	
What things are	e changing?					
Thing			Describe how it chan	ges		
			ngs that change?			
Field name (c	langerX, score, p	olayerIMG)	Datatype (Num	ber, String, Image, Bo	oolean.)
Make a To-Do	List, and check	off each as "[Done" when you fir	nish each one.		
Component	When is there				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					
next-state-tick	If the Data Structure changed, or the animation happens automatically					
next-state-key	If the Data Struc	cture changed,	or a keypress trigger	rs the animation		
reactor	If either next-stc	ate function is n	ew			

Build Your Own Animation	

Draw a sketch	for three distinc	t moments of	the animation			
Sket	ch A	Ske	etch B	Sketch	С	
What things are	e changing?					
Thing		[Describe how it chan	ges		
	you need to re langerX, score, p		ngs that change? Datatype (Num	ber, String, Image, Bo	polean.)
(0						,
Make a To-Do I	List, and check	off each as "[Done" when you fir	nish each one.		
Component	When is there				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					
next-state-tick	If the Data Structure changed, or the animation happens automatically					
next-state-key	If the Data Struc	cture changed,	or a keypress trigger	rs the animation		
reactor	If either next-sto	ate function is ne	ew			

Draw a sketch	for three distinc	t moments of	the animation			
Sketo	ch A	Sketch B Sketcl			C	
		0		J. G.		
What things are Thing	e changing?		Describe how it ch	anaes		
IIIIIg			Describe now ii ch	luliges		
			ngs that change?			
Field name (c	dangerX, score, p	olayerlMG)	Datatype (Num	nber, String, Image, Bo	oolean.)
Make a Te De l	ist and shock	off agab as "F	one" when you fir	aich agab ana		
Component		work to be do			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					
next-state-tick	If the Data Structure changed, or the animation happens automatically					
next-state-key	If the Data Struc	If the Data Structure changed, or a keypress triggers the animation				
reactor	If either next-sto	ate function is ne	ew			

Draw a sketch	for three distinc	t moments of	the animation			
Sketo	ch A	Ske	etch B	Sketch	С	
What things are	e chanaina?					
Thing			Describe how it ch	anges		
	I					
What fields do	you need to re	present the thi	ngs that change?			
	langerX, score, p			ber, String, Image, Bo	olean.)
Make a To-Do l Component		off each as "L work to be do	one" when you fir		To-Do	Dono
-					10-00	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					
next-state-tick	If the Data Structure changed, or the animation happens 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	èw			