Name: _____

Student Workbook

BOOTSTRAP
Equity • Scale • Rigor

Workbook v1.5

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Unit 1 (Review)

Unit 1

	Racket Code	Pyret Code

1	`(define AGE 14)`
	`(define A-NUMBER 0.6)`
	`(define SPEED -90)`
		`AGE = 14`
		`A-NUMBER = 0.6`
		`SPEED = -90`
		Two of your own:
		_____
		_____

2	`(define CLASS "Bootstrap")`
	`(define PHRASE "Coding is fun!")`
	`(define A-STRING "2500")`
		`CLASS = "Bootstrap"`
		`PHRASE = "Coding is fun!"`
		`A-STRING = "2500"`
		Two of your own:
		_____
		_____

	Racket Code	Pyret Code

3	`(define SHAPE`
	`  (triangle 40 "outline" "red"))`
	
	`(define OUTLINE`
	`  (star 80 "solid" "green"))`
	
	`(define SQUARE`
	`  (rectangle 50 50 "solid" "blue"))`
		`SHAPE =`
		`  triangle(40, "outline", "red")`
		
		`OUTLINE =`
		`  star(80, "solid", "green")`
		
		`SQUARE =`
		`  rectangle(50, 50, "solid", "blue")`
		
		One of your own:
		
		_____

4	`(define BOOL true)`
	
	`(define BOOL2 false)`
		`BOOL = true`
		
		`BOOL2 = false`
		
		One of your own:
		
		_____

5	`; double : Number -> Number`
	`; Given a number, multiply by`
	`; 2 to double it`
	
	`(EXAMPLE (double 5) (* 2 5))`
	
	`(EXAMPLE (double 7) (* 2 7))`
	
	`(define (double n) (* 2 n))`
		`# double :: Number -> Number`
		`# Given a number, multiply by`
		`# 2 to double it`
		
		`examples:`
		`  double(5) is 2 * 5`
		`  double(7) is 2 * 7`
		`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.

Directions :

Contract and Purpose Statement

Every contract has three parts...

double:: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

double ("5") **is** 2 * 5

function name *input(s)* *what the function produces*

double ("7") **is** 2 * 7

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun double(n):

function name *variable(s)*

2 * n

what the function does with those variable(s)

end

Directions :

Contract and Purpose Statement

Every contract has three parts...

_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun _____ (_____):

function name *variable(s)*

_____

what the function does with those variable(s)

end

Fast Functions!

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

Directions :

Contract and Purpose Statement

Every contract has three parts...

_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun _____ (_____):

function name *variable(s)*

_____

what the function does with those variable(s)

end

Directions :

Contract and Purpose Statement

Every contract has three parts...

_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun _____ (_____):

function name *variable(s)*

_____

what the function does with those variable(s)

end

Fast Functions!

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

Directions :

Contract and Purpose Statement

Every contract has three parts...

_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun _____ (_____):

function name *variable(s)*

_____

what the function does with those variable(s)

end

Directions :

Contract and Purpose Statement

Every contract has three parts...

_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun _____ (_____):

function name *variable(s)*

_____

what the function does with those variable(s)

end

Syntax and Style Bug Hunting: Pyret Edition

	Buggy Code	Correct Code / Explanation

1	`SECONDS = (7)`
	
	`STRING = my string`	

2	`SHAPE1 = circle(50 "solid" "blue")`
	
	`SHAPE2 = triangle(75, outline,`
	`yellow)`	

3	`# triple :: Number -> Number`
	`# Multiply a given number by`
	`# 3 to triple it`
	
	`examples:`
	`  triple(5) = 3 * 5`
	`  triple(7) = 3 * 7`
	`end`	

4	`fun triple(n):` `  3 * n`	

5	`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(33, "solid",`
	`"yellow")`
	`end`
	
	`ys(size):`
	`  star(size "solid" "yellow")`
	`end`	

Unit 2 (Intro to Data Structures)

Word Problem: double-radius

Directions : 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 and Purpose Statement

Every contract has three parts...

_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun _____ (_____):

function name *variable(s)*

_____

what the function does with those variable(s)

end

Word Problem: double-width

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

Contract and Purpose Statement

Every contract has three parts...

_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun _____ (_____):

function name *variable(s)*

_____

what the function does with those variable(s)

end

Word Problem: next-position

Directions : 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 and Purpose Statement

Every contract has three parts...

_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun _____ (_____):

function name *variable(s)*

_____

what the function does with those variable(s)

end

Data Structure

```
# A CakeType is a flavor, layers, & is-iceCream
data CakeType:
    | cake(____________________________________________________
           ____________________________________________________
           ____________________________________________________)
      end
```

To make an instance of this structure, I would write:

```
cake1 = ____________________________________________________

cake2 = ____________________________________________________
```

To access the fields of `cake2`, I would write:

```
____________________________________________________

____________________________________________________

____________________________________________________
```

Word Problem: taller-than

Directions : 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.

Contract and Purpose Statement

Every contract has three parts...

_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun _____ (_____):

function name *variable(s)*

_____

what the function does with those variable(s)

end

Word Problem: will-melt

Directions : 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 and Purpose Statement

Every contract has three parts...

_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun _____ (_____):

function name *variable(s)*

_____

what the function does with those variable(s)

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
constructor	data block
name	purpose

`author` is a _____

`book` is a _____

`MediaType` is a _____

`book1` is a _____

`title` is a _____

`data … end` is a _____

Unit 3 (Structures, Reactor, & Animations)

Identifying Animation Data Worksheet

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 ...)

Data Structure

```
# a ________State is ____________________________________________________________
data ________State:
    | ____________(____________________________________________________
                  ____________________________________________________
                  ____________________________________________________)
end
```

Make a sample instance 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 behing the horizon (the ground) once it is low in the sky.

Contract and Purpose Statement

```
draw-state :: ____________________________________ -> Image
# ____________________________________________________________________________
```

Write an expression for each piece of your final image

SUN =	
GROUND =	
SKY =	

Write the draw-state function, using put-image to combine your pieces

```
fun ________________(____________________________________________________):
      ____________________________________________________________________
      ____________________________________________________________________
      ____________________________________________________________________
end
```

Word Problem: next-state-tick

Directions : 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 and Purpose Statement

Every contract has three parts...

_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun _____ (_____):

function name *variable(s)*

_____

what the function does with those variable(s)

end

Identifying Animation Data Worksheet

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 ...)

Data Structure

```
# a ________State is ____________________________________________________________
data ________State:
    | ____________(____________________________________________________
                  ____________________________________________________
                  ____________________________________________________)
end
```

Make a sample instance for each sketch from the previous page:

_____ = _____

_____ = _____

_____ = _____

Identifying Animation Data Worksheet

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 ...)

Data Structure

```
# a ________State is ____________________________________________________________
data ________State:
    | ____________(____________________________________________________
                  ____________________________________________________
                  ____________________________________________________)
end
```

Make a sample instance for each sketch from the previous page:

_____ = _____

_____ = _____

_____ = _____

Identifying Animation Data Worksheet

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 ...)

Data Structure

```
# a ________State is ____________________________________________________________
data ________State:
    | ____________(____________________________________________________
                  ____________________________________________________
                  ____________________________________________________)
end
```

Make a sample instance for each sketch from the previous page:

_____ = _____

_____ = _____

_____ = _____

Identifying Animation Data Worksheet

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 ...)

Data Structure

```
# a ________State is ____________________________________________________________
data ________State:
    | ____________(____________________________________________________
                  ____________________________________________________
                  ____________________________________________________)
end
```

Make a sample instance for each sketch from the previous page:

_____ = _____

_____ = _____

_____ = _____

Unit 4 (Functions That Ask Questions)

Word Problem: location

Directions : 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".

Contract and Purpose Statement

Every contract has three parts...

_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun _____ (_____):

function name *variable(s)*

_____

what the function does with those variable(s)

end

Syntax and Style Bug Hunting: Piecewise Edition

	Buggy Code	Correct Code / Explanation

1	`fun piecewisefun(n):`
	` if (n > 0): n`
	` else: 0`	

2	`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`	

3	`fun absolute-value(a b):`
	` if a > b: a - b`
	` b - a`
	` end`
	`end`	

4	`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 Data Worksheet

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

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?*	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-state function is new*	☐	☐

1) Make a sample instance for each sketch from the previous page:

_____ =

_____ =

_____ =

2) Write at least one NEW example for one of the functions on your To-Do list

3) If you have another function on your To-Do list, write at least one NEW example

Word Problem: draw-sun

Directions : 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 and Purpose Statement

Every contract has three parts...

_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun _____ (_____):

function name *variable(s)*

_____

what the function does with those variable(s)

end

Unit 5 (Key Events)

Animation Data Worksheet

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

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?*	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-state function is new*	☐	☐

1) Make a sample instance for each sketch from the previous page:

FULLPET = pet(100, 100)

MIDPET = pet(50, 75)

LOSEPET = pet(0, 0)

2) 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 – 1)

next-state-tick(MIDPET) is pet(MIDPET.hunger – 2, MIDPET.sleep – 1)

next-state-tick(LOSEPET) is LOSEPET

3) If you have another function on your To-Do list, write at least one NEW example

Animation Data Worksheet

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

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?*	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-state function is new*	☐	☐

1) Make a sample instance for each sketch from the previous page:

_____ =

_____ =

_____ =

2) Write at least one NEW example for one of the functions on your To-Do list

3) If you have another function on your To-Do list, write at least one NEW example

Animation Data Worksheet

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

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?*	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-state function is new*	☐	☐

1) Make a sample instance for each sketch from the previous page:

_____ =

_____ =

_____ =

2) Write at least one NEW example for one of the functions on your To-Do list

3) If you have another function on your To-Do list, write at least one NEW example

Refactoring

Your Own Drawing Functions

Build Your Own Animation

Animation Data Worksheet

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

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.

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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-state function is new*	☐	☐

Define the Data Structure

```
# a ______________State is ____________________________________________
data ______________State:
| ______________ (____________________________________________________________
                  ____________________________________________________________
                  ____________________________________________________________
                  ____________________________________________________________)
end
```

Make a sample instance for each sketch from the previous page

```
_______________ = ____________________________________________________________
_______________ = ____________________________________________________________
_______________ = ____________________________________________________________
```

Write an example for one of the functions on the previous page

_____

_____

_____

_____

_____

Collisions

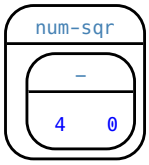
Distance

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 to Pyret code.

Word Problem: distance

Directions : Write a function `distance` , which takes FOUR inputs: (1) px: The x-coordinate of the player, (2) py: The y-coordinate of the player, (3) cx: The x-coordinate of another game character, (4) cy: The y-coordinate of another game character. It should return the distance between the two, using the Distance formula: Distance^2 = (px − cx)^2 + (py − cy)^2

Contract and Purpose Statement

Every contract has three parts...

_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

Write some examples, then circle and label what changes...

examples:

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

_____ (_____) **is** _____

function name *input(s)* *what the function produces*

end

Definition

Write the definition, giving variable names to all your input values...

fun _____ (_____):

function name *variable(s)*

_____

what the function does with those variable(s)

end

Word Problem: is-collision

Directions : Write a function `is-collision` , which takes FOUR inputs: (1) px: The x-coordinate of the player, (2) py: The y-coordinate of the player, (3) cx: The x-coordinate of another game character, (4) 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.

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_____ :: _____ -> _____

function name *domain* *range*

_____

what does the function do?

Examples

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`examples:`

_____ (_____) **`is`** _____

function name *input(s)* *what the function produces*

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what the function does with those variable(s)

`end`

Notes

Nested Structures

Timers

Directions :

Contract and Purpose Statement

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Animation Data Worksheet

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

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?*	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-state function is new*	☐	☐

Define the Data Structure

```
# a ______________State is ____________________________________________
data ______________State:
| ______________ (____________________________________________________________
                  ____________________________________________________________
                  ____________________________________________________________
                  ____________________________________________________________)
end
```

Make a sample instance for each sketch from the previous page

```
______________ = ____________________________________________________________
______________ = ____________________________________________________________
______________ = ____________________________________________________________
```

Write an example for one of the functions on the previous page

_____

_____

_____

_____

_____

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_____

_____

_____

_____

_____

Contracts

Contracts tell us how to use a function. For example: `num-sqr :: (n :: Number) -> Number` tells us that the name of the function is `num-sqr`, it takes one inp
(a `Number`), and it evaluates to a `Number`. From the contract, we know `num-sqr(4)` will evaluate to a `Number`.

Name		Domain		Range
# triangle	::	(side-length :: Number, style :: String, color :: String)	->	Image
#				
# circle	::	(radius :: Number, style :: String, color :: String)	->	Image
#				
# star	::	(radius :: Number, style :: String, color :: String)	->	Image
#				
# rectangle	::	(width :: Num, height :: Num, style :: Str, color :: Str)	->	Image
#				
# ellipse	::	(width :: Num, height :: Num, style :: Str, color :: Str)	->	Image
#				
# square	::	(size-length :: Number, style :: String, color :: String)	->	Image
#				
# text	::	(str :: String, size :: Number, color :: String)	->	Image
#				
# overlay	::	(img1 :: Image, img2 :: Image)	->	Image
#				
# beside	::	(img1 :: Image, img2 :: Image)	->	Image
#				
# image-url	::	(url :: String)	->	Image
#				

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Name		Domain		Range
# above	::	(img1 :: Image, img2 :: Image)	->	Image
#				
# put-image	::	(img1 :: Image, x :: Number, y :: Number, img2 :: Image)	->	Image
#				
# rotate	::	(degree :: Number, img :: Image)	->	Image
#				
# scale	::	(factor :: Number, img :: Image)	->	Image
#				
# string-repeat	::	(text :: String, repeat :: Number)	->	String
#				
# string-contains	::	(text :: String, search-for :: String)	->	Boolean
#				
# num-sqr	::	(n :: Number)	->	Number
#				
# num-sqrt	::	(n :: Number)	->	Number
#				
# num-min	::	(a :: Number, b:: Number)	->	Number
#				
# num-max	::	(a :: Number, b:: Number)	->	Number
#				

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(a `Number`), and it evaluates to a `Number`. From the contract, we know `num-sqr(4)` will evaluate to a `Number`.

Name		Domain		Range
# string-equal	::	(str1 :: String, str2 :: String)	->	Boolean
#				
# and	::	(test1 :: Boolean, test2 :: Boolean)	->	Boolean
#				
# or	::	(test1 :: Boolean, test2 :: Boolean)	->	Boolean
#				
#	::		->	
#				
#	::		->	
#				
#	::		->	
#				
#	::		->	
#				
#	::		->	
#				
#	::		->	
#				
#	::		->	
#				