Name: ____

Bootstrap:2

www.bootstrapworld.org

Class: ____

Lesson 1

	Racket Code	Pyret Code

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

Strings	`(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:
		________________
		________________

	`(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:
		______________________________
Booleans	`(define BOOL true)`	`BOOL = true`
	`(define BOOL2 false)`	One of your own:
		______________________________
Functions	`; 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) (*  2  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	: Number	-> Number
name	domain	range

```
examples:
    double ( 5 ) is 2 * 5
    double ( 7 ) is 2 * 7
end                  n              n
fun double ( n ):

    2 * n

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 yourself.

____________________:____________________ -> ____________________

name 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 yourself.

______________________:______________________ -> ____________________
name domain range

```
examples:
    ____________(_________) is ____________________________
    ____________(_________) is ____________________________
end
fun _____________(___________________):

    ______________________________________________________
end
```

______________________:______________________ -> ____________________
name domain range

```
examples:
    ____________(_________) is ____________________________
    ____________(_________) is ____________________________
end
fun _____________(___________________):

    ______________________________________________________
end
```

Bug Hunting: Pyret Edition

#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(99, “solid”, “yellow”)

	ys(size):
	    star(size “solid” “yellow”)
	end
	```

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+Purpose Statement

Every contract has three parts:

```
# _______________ : ____________________________________ -> ____________
       name                           Domain                        Range

# __________________________________________________________________________
                          What does the function do?
```

Give Examples

Write examples of your function in action

```
examples:
      ______________(_____________________)        is
             the user types...

     ______________________________________________________________________
                        ...which should become

      ______________(_____________________)        is
           the user types...

     ______________________________________________________________________
                            ...which should become
end
```

Function

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!

```
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.

Contract+Purpose Statement

Every contract has three parts:

```
# ______________ : _________________________________ -> ___________
      name                      Domain                        Range

# __________________________________________________________________
                        What does the function do?
```

Give Examples

Write examples of your function in action

```
examples:
     ______________(____________________)        is
          the user types…

    ______________________________________________________________
                   ...which should become

     ______________(____________________)        is
          the user types…

    ______________________________________________________________
                   ...which should become
end
```

Function

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!

```
fun ____________________(___________________):

    ______________________________________________________________
end
```

Word Problem: next-position

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

Contract+Purpose Statement

Every contract has three parts:

```
# ______________ : __________________________________ -> ___________
       name                          Domain                   Range

# ____________________________________________________________________
                         What does the function do?
```

Give Examples

Write examples of your function in action

```
examples:
      ______________(____________________)        is
             the user types...

     _____________________________________________________________
                    ...which should become

      ______________(____________________)        is
           the user types...

     _____________________________________________________________
                        ...which should become
end
```

Function

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!

```
fun ____________________(___________________):


      ______________________________________________________________
end
```

Data Structure

```
# a Cake is a flavor, color, message, layers, & is-iceCream
data Cake:
    |  cake(________________________________________
            ________________________________________
            ________________________________________
            ________________________________________
            ________________________________________)
end
```

To make examples of this structure, I would write:

cake1 = ____

cake2 = ____

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

____

____

____

____

____

Lesson 3

Data Structure

```
# a Party is a location, theme, and number of guests
data Party:
    |   party(______________________________________________
               ______________________________________________
               ______________________________________________)
end
```

To make examples of this structure, I would write:

```
party1 = ________________________________________________

party2 = ________________________________________________
```

To access the fields of **party2**, I would write:

____

____

____

Word Problem: change-flavor

Write a function called *change-flavor,* which takes in a Cake and a flavor, and returns a new Cake that is almost the same as the original, but is now the given flavor.

Contract+Purpose Statement

________________ : ______________________________ -> ___________

____

Give Examples

```
examples:

    ______________(_____________________)        is

              ________________________________________
              ________________________________________
              ________________________________________
              ________________________________________
              ________________________________________

    ______________(_____________________)        is

              ________________________________________
              ________________________________________
              ________________________________________
              ________________________________________
              ________________________________________
end
```

Function

```
fun ____________________(___________________):

              ________________________________________
              ________________________________________
              ________________________________________
              ________________________________________
              ________________________________________
end
```

Word Problem: will-melt

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

Contract+Purpose Statement

```
# ________________ : ______________________________ -> ___________

# _________________________________________________________________
```

Give Examples

```
examples:

    ______________(_____________________)        is

    ___________________________________________________________

    ______________(_____________________)        is

    ___________________________________________________________
end
```

Function

```
fun ____________________(___________________):

    ___________________________________________________________
end
```

Lesson 4

Lesson 5

Word Problem: keypress (Ninja World)

State the Problem

For each keypress in Ninja World, show how (keypress <world > <key>) should change the world.

Contract+Purpose Statement

```
#        keypress        :        World            String            ->        World

# Given a world and a key, produce a new world with NinjaCat's position
# moved by 10 pixels, depending on which arrow key was pressed
```

Give Examples

```
examples:
      keypress(worldA, "up")      is
            world(worldA.dogX, worldA.coinX, worldA.catX, worldA.catY + 10)

      keypress(worldB, "down")    is
            world(worldB.dogX, worldB.coinX, worldB.catX, worldB.catY - 10)

      keypress(worldA, "left")    is
            world(worldA.dogX, worldA.coinX, worldA.catX - 10, worldA.catY)

      keypress(worldB, "right")   is
            world(worldB.dogX, worldB.coinX, worldB.catX + 10, worldB.catY)
end
```

```
fun  keypress(current-world, key) :

       ask:
        | string-equal(key, "up") then:

              world(current-world.dogX, current-world.coinX,
                    current-world.catX, current-world.catY + 10)

        | string-equal(key, "down") then:

              world(current-world.dogX, current-world.coinX,
                    current-world.catX, current-world.catY + 10)

        | string-equal(key, "left") then:

              world(current-world.dogX, current-world.coinX,
                     current-world.catX - 10, current-world.catY)

        | string-equal(key, "right") then:

              world(current-world.dogX, current-world.coinX,
                     current-world.catX + 10, current-world.catY)

        | otherwise: current-world

       end
end
```

Word Problem: next-world (Ninja World)

Given a world, return the next world by adding 10 to dogX, subtracting 5 from coinX, and subtracting 5 from catY *only* when the cat's y-coordinate is greater than 75.

Contract+Purpose Statement

```
# _______________ : ____________________________ -> __________

# _____________________________________________________________
```

Give Examples

```
examples:

     ____________(__________________)        is

              __________________________________
              __________________________________
              __________________________________
              __________________________________
              __________________________________

     ____________(__________________)        is

              __________________________________
              __________________________________
              __________________________________
              __________________________________
              __________________________________
end
```

```
fun ____________________(___________________):

        ask:
         | _______________________________________ then:

              _______________________________________
              _______________________________________
              _______________________________________
              _______________________________________
              _______________________________________
         | otherwise:

              _______________________________________
              _______________________________________
              _______________________________________
              _______________________________________
              _______________________________________
         end
end
```

Lesson 6

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.

# ______________________ : ______________________________ -> ______________

# ____

Give Examples

```
examples:
______________(________________) is ____________________________________

______________(________________) is ____________________________________

______________(________________) is ____________________________________

______________(________________) is ____________________________________
end
```

Function

```
fun ________________(______________________):
     ask:
          | ____________________________________________ then:

            ______________________________________________________________

          | ____________________________________________ then:

            ______________________________________________________________

          | ____________________________________________ then:

            ______________________________________________________________

          | ____________________________________________ then:

            ______________________________________________________________
     end
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.

# ______________________ : ________________________________ -> ______________________

# ____

Give Examples

```
examples:

    ________________(____________________)  is

        ________________________________________

    ________________(____________________)  is

        ________________________________________

    ________________(____________________)  is

        ________________________________________
end
```

Function

```
fun ____________(________________):
    ask:
        | ________________________________________ then:

          ________________________________________

        | ________________________________________ then:

          ________________________________________

        | otherwise: ______________________________
    end
end
```

Building Your Helper Functions

# is-off-right :____________________ -> ________________

```
examples:
  ____________________(________)  is

                 ______________________________________

  ____________________(________)  is

                 ______________________________________

end
fun ____________(__________________):

    ____________________________________________________
 end
```

# is-off-left :__________________ -> ________________

```
examples:
  ____________________(________)  is

                 ______________________________________

  ____________________(________)  is

                 ______________________________________

end
fun ____________(__________________):

    ____________________________________________________
 end
```

```
# ____________________:____________________ -> __________________
examples:
   ______________________(__________)  is
              _______________________________________________________
   ______________________(__________)  is
              _______________________________________________________
end
fun ______________(____________________):

   ____________________________________________________________________
end
```

```
# ____________________:____________________ -> ___________________
examples:
   ______________________(__________)  is
              _______________________________________________________
   ______________________(__________)  is
              _______________________________________________________
end
fun ______________(____________________):

   ____________________________________________________________________
end
```

Lesson 7

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.

Contract+Purpose Statement

________________ : ____________________________________ -> ____________

____

Give Examples

```
examples:
    ______________(______________)        is

    _______________________________________________________________

    ______________(______________)        is

    _______________________________________________________________

end
```

Function Header

```
fun ____________________(____________________):
        function name             variable names

    ______:
```


```
    end

end
```

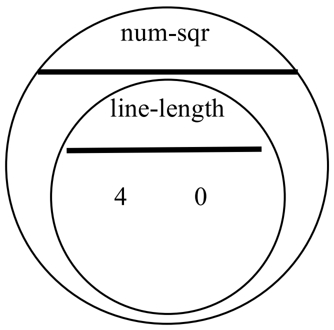
Distance:

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:

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

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:*

- ❑ *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:

$$\text{Distance}^2 = (\text{line-length px cx})^2 + (\text{line-length py cy})^2)$$

Contract+Purpose Statement

_______________ : _________________________________ -> ___________

____

Give Examples

Write examples of your function in action

```
examples:
     _____________(_____________)       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
- ❑ 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:
    __________________________(_____________________)       is

    ______________________________________________________________

    ______________________________________________________________

    __________________________(_____________________)       is

    ______________________________________________________________

    ______________________________________________________________
end
```

Function

```
fun ___________________(__________________):

    ____________________________________________________________

    ____________________________________________________________
end
```

Game Design

"Start Simple, Get Complex"

Draw a rough sketch of your game when it begins, and another sketch just a moment later

A sketch at the START of the game…

A sketch for the very NEXT moment…

What images will you need for your game? Name them in the 1st column, and describe them in the 2nd

BACKGROUND	

List everything that has changed from one sketch to the other. What datatype will represent it?

Changed (position, score, color, costume…)	**Datatype** (Number, String, Image, Boolean…)

```
# a world is a ________________________________
data World:
    | world(_____________________________________
            _____________________________________
            _____________________________________
            _____________________________________
            _____________________________________)
end
```

To make example worlds that represent my sketches from page 31, I would write…

worldA = ____

worldB = ____

To access the fields of **worldA**, I would write:

____

____

____

____

____

Lesson 8

Word Problem: draw-world (My game)

Contract

______________ : ________________________________ -> ___________

Definition

```
fun ______________(________________________________) :

  put-image(______________________________________________
            ______________________________________________
            ______________________________________________
            ______________________________________________
            ______________________________________________
            ______________________________________________
            ______________________________________________
            ______________________________________________
            ______________________________________________
            ______________________________________________
            ______________________________________________
            ______________________________________________
            ______________________________________________
            ______________________________________________

end
```

Word Problem: next-world (My game)

State the problem (What changes?):

Contract+Purpose Statement

____________ : __________________________ -> __________
____

Give Examples

```
examples:
    ___________(________________)     is
               ______________________________
               ______________________________
               ______________________________
               ______________________________
               ______________________________
    ___________(________________)     is
               ______________________________
               ______________________________
               ______________________________
               ______________________________
               ______________________________
end
```

Function

```
fun ________________(________________):
               ______________________________
               ______________________________
               ______________________________
               ______________________________
               ______________________________
end
```

Lesson 9

When *this* key is pressed…	..*this* field of the new world...	…changes by…

Word Problem: keypress (My game)

For each keypress in your game, show how `keypress(worldA, <key>)` should change your world.

______________________ : ______________________________ -> ______________

____

Give Examples

```
examples:
    keypress(worldA, __________)        is
                ________________________________________
                ________________________________________
                ________________________________________
                ________________________________________
                ________________________________________
    keypress(worldA, __________)        is
                ________________________________________
                ________________________________________
                ________________________________________
                ________________________________________
                ________________________________________
    keypress(worldA, __________)        is
                ________________________________________
                ________________________________________
                ________________________________________
                ________________________________________
                ________________________________________
end
```

```
fun ______________(___________________________________)
    ask:
        | ________________________________________ then:

          _______________________________________________

        | ________________________________________ then:

          _______________________________________________

        | ________________________________________ then:

          _______________________________________________

        | ________________________________________ then:

          _______________________________________________

        | ________________________________________ then:

          _______________________________________________

        | ________________________________________ then:

          _______________________________________________

        |_______________________________________________

    end
end
```

Building Your Helper Functions

# is-off-right :____________________ -> __________________

```
examples:
   ____________________(________)  is
              ______________________________________
   ____________________(________)  is
              ______________________________________
end
fun ____________(_________________):
   ____________________________________________________
 end
```

# is-off-left :____________________ -> __________________

```
examples:
   ____________________(________)  is
              ______________________________________
   ____________________(________)  is
              ______________________________________
end
fun ____________(_________________):
   ____________________________________________________
```

```
 end

# ____________________:____________________ -> __________________

examples:
   ______________________(_________)  is
               ______________________________________________________
   ______________________(_________)  is
               ______________________________________________________
end

fun ______________(____________________):

   _________________________________________________________________
end
```

```
# ____________________:____________________ -> ___________________

examples:
   ______________________(_________)  is
               ______________________________________________________
   ______________________(_________)  is
               ______________________________________________________
end

fun ______________(____________________):

   _________________________________________________________________
end
```

Using Helpers inside `next-world`:

How does the World structure change when….?

TEST	RESULT
	world(____ ____ ____ ____ ____)
	world(____ ____ ____ ____ ____)
	world(____ ____ ____ ____ ____)
	world(____ ____ ____ ____ ____)

TEST	RESULT
	world(____ ____ ____ ____ ____)
	world(____ ____ ____ ____ ____)
	world(____ ____ ____ ____ ____)
	world(____ ____ ____ ____ ____)

Using Helpers inside `draw-world`:

What changes the *appearance* of your game?

TEST	RESULT
	put-image(_______________________________________ put-image(_________________________________ put-image(__________________________________ put-image(__________________________________ put-image(__________________________________
	put-image(_______________________________________ put-image(_________________________________ put-image(__________________________________ put-image(__________________________________ put-image(__________________________________
	put-image(_______________________________________ put-image(_________________________________ put-image(__________________________________ put-image(__________________________________ put-image(__________________________________
	put-image(_______________________________________ put-image(_________________________________ put-image(__________________________________ put-image(__________________________________ put-image(__________________________________

TEST	RESULT
	put-image(____ put-image(___________________________________ put-image(____________________________________ put-image(____________________________________ put-image(____________________________________
	put-image(____ put-image(___________________________________ put-image(____________________________________ put-image(____________________________________ put-image(____________________________________
	put-image(____ put-image(___________________________________ put-image(____________________________________ put-image(____________________________________ put-image(____________________________________
	put-image(____ put-image(___________________________________ put-image(____________________________________ put-image(____________________________________ put-image(____________________________________

Lesson 10

Supplemental

Design Recipe

Contract+Purpose Statement

Every contract has three parts:

________________ : ____________________________________ -> _____________

name Domain Range

____

What does the function do?

Give Examples

Write examples of your function in action

```
examples:
    _______________(_______________)          is
           the user types…

    ______________________________________________________________________
                    ...which should become

    _______________(_______________)          is
           the user types…

    ______________________________________________________________________
                    ...which should become
end
```

Function

Circle the changes in the examples, and name the variables.

```
fun ____________________(____________________):

    __________________________________________________________________
end
```

Design Recipe

Contract+Purpose Statement

Every contract has three parts:

________________ : ____________________________________ -> _____________

name Domain Range

____

What does the function do?

Give Examples

Write examples of your function in action

```
examples:
     _______________(_______________)        is
            the user types...

     ___________________________________________________________
                 ...which should become

     _______________(_______________)        is
            the user types...

     ___________________________________________________________
                 ...which should become
end
```

Function

Circle the changes in the examples, and name the variables.

```
fun ____________________(____________________):

     __________________________________________________________
end
```

Contracts

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

Contracts

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