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
  (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")
```<br><br>One of your own:<br><br>_____ |
| *Booleans* | ```
(define BOOL true)

(define BOOL2 false)
``` | ```
BOOL = true
```<br><br>One of your own:<br><br>_____ |
| *Functions* | ```
; 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
``` |
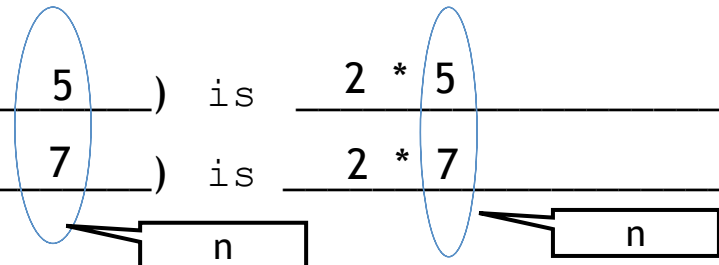
2

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

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

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.

Every contract has three parts:

\# _____ : _____ -> _____
       name   Domain   Range

\# _____
                                What does the function do?

Write examples of your function in action

```
examples:
        _____(_____)        is


        _____
                        …which should become


        _____(_____)        is


        _____
                        …which should become
end
```

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
```

```
# a Car is a model, hp, rims, color, and price
data Car:
    | car(_____
          _____
          _____
          _____
          _____)
end
```

To make examples of this structure, I would write:

car1 = _____

car2 = _____

To access the fields of **car2**, I would write:

_____

_____

_____

_____

_____

Lesson 3

```
# 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: paint-job

Write a function called *paint-job* which takes in a Car and a color, and gives back a new Car that is mostly the same as the original, but now has the given color.

Contract+Purpose Statement

\# _____ : _____ -> _____

\# _____

Give Examples

```
examples:

        _____(_____)        is

            _____
            _____
            _____
            _____
            _____

        _____(_____)        is

            _____
            _____
            _____
            _____
            _____

end
```

Function

```
fun _____(_____):

            _____
            _____
            _____
            _____
            _____

end
```

Word Problem: turbo-charge

Write a function called *turbo-charge*, which takes in a Car, and gives back a Car that has 20 more horsepower.

Contract+Purpose Statement

\# _____ : _____ -> _____

\# _____

Give Examples

```
examples:
```

_____(_____)   is

_____

_____

_____

_____

_____

_____(_____)   is

_____

_____

_____

_____

_____

```
end
```

Function

```
fun _____(_____):
```

_____

_____

_____

_____

_____

```
end
```

Lesson 4

Contract+Purpose Statement

\# _____ : _____ -> _____

\# _____

Give Examples

```
examples:

        _____(_____)        is

                _____

                _____

                _____

                _____

                _____

        _____(_____)        is

                _____

                _____

                _____

                _____

                _____

end
```

Function

```
fun _____(_____):

                _____

                _____

                _____

                _____

                _____

end
```
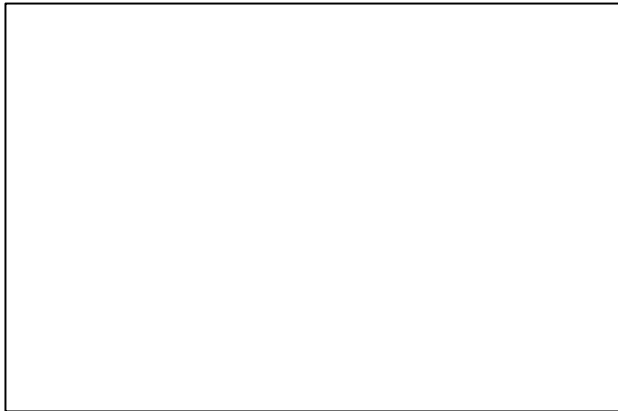
GAME DESIGN
"Start Simple, Get Complex"

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 START and NEXT sketches from page 17, I would write…

START = _____

NEXT = _____

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

_____

_____

_____

_____

_____

Lesson 5

Word Problem: draw-world

_____ : _____ -> _____

Definition

fun _____(_____):

  put-image(_____

  _____

  _____

  _____

  _____

  _____

  _____

  _____

  _____

  _____

  _____

end

Word Problem: update-world

State the problem (What changes?):

Contract+Purpose Statement

\# _____ : _____ -> _____

\# _____

Give Examples

`examples:`

      _____(_____)   `is`

            _____

            _____

            _____

            _____

            _____

      _____(_____)   `is`

            _____

            _____

            _____

            _____

            _____

`end`

Function

`fun` _____(_____)`:`

            _____

            _____

            _____

            _____

            _____

`end`

Lesson 6

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

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Word Problem: keypress (Ninja World)

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(START, "up")   is
                world(START.dogX, START.coinX, START.catX, START.catY + 10)

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

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

        keypress(NEXT, "right")   is
                world(NEXT.dogX, NEXT.coinX, NEXT.catX + 10, NEXT.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: keypress (My game)

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

\# _____ : _____ -> _____

\# _____

Give Examples

```
examples:
     keypress(START, _____)          is

          _____
          _____
          _____
          _____
          _____

     keypress(START, _____)          is

          _____
          _____
          _____
          _____
          _____

     keypress(START, _____)          is

          _____
          _____
          _____
          _____
          _____

end
```

fun _____(_____)
    ask:
        | _____ then:

        _____

        | _____ then:

        _____

        | _____ then:

        _____

        | _____ then:

        _____

        | _____ then:

        _____

        | _____ then:

        _____

        | _____

```
    end
end
```

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 shape. All shapes should be solid and red, and can be whatever size you choose.

```
# _____ : _____ -> _____

# _____
```

```
examples:
_____(_____) is _____

_____(_____) is _____

_____(_____) is _____

_____(_____) is _____
end
```

Function

```
fun _____(_____):
    ask:
        | _____ then:

          _____

        | _____ then:

          _____

        | _____ then:

          _____
```

| _____ then:

_____

    end

end

Lesson 7

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.

\# _____ : _____ -> _____

\# _____

examples:

_____(_____) is

_____

_____(_____) is

_____

_____(_____) is

_____

end

Function

fun _____(_____):

    ask:

        | _____ then:

           _____

        | _____ then:

           _____

        | otherwise: _____

    end

end

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 `update-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 8

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
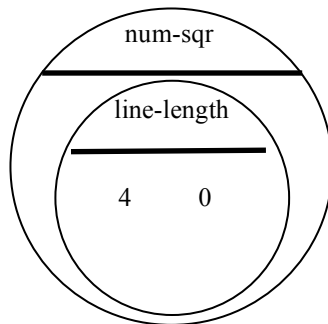
    _____:

    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!)

num-sqr

line-length

4   0

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
```

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
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	

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Contracts

Name	Domain	Range	example
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	
#	..	↑	