

Unidades de Bootstrap

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Coordinadas**

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de caracteres e
Imágenes**

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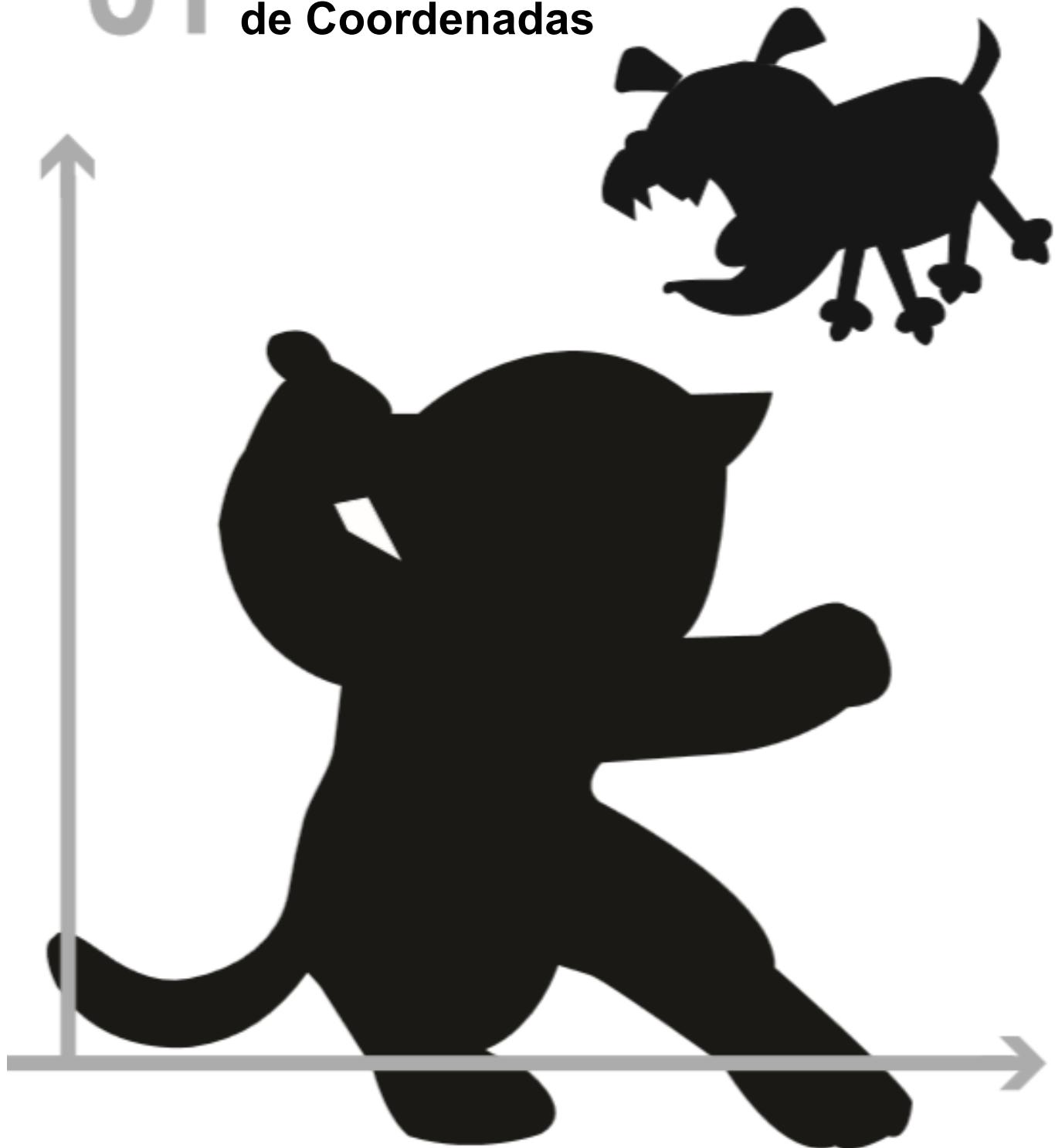
09

**Preparándonos
para el
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**Materiales
Adicionales**

01 Videojuegos y Planos de Coordenadas



Nuestro videojuego

Creado por (escribe tu nombre): _____

El ambiente

Nuestro juego se desarrolla en: _____
(¿El espacio? ¿El desierto? ¿Un centro comercial?)

El jugador

El jugador es un _____.

El jugador se mueve solamente hacia arriba y abajo.

El objetivo

Tu jugador GANA puntos cuando golpea el objetivo.

El Objetivo es un _____.

El Objetivo se mueve solamente de izquierda a derecha.

El peligro

Tu jugador PIERDE puntos cuando golpea el peligro.

El Peligro es un _____.

El Peligro se mueve solamente de izquierda a derecha.

I. Círculo de prácticas de evaluación Tiempo: 5 minutos

No olvides usar los símbolos de la computadora para operaciones como multiplicar y dividir!

Operación matemática	Círculo de evaluación	Código Racket
-----------------------------	------------------------------	----------------------

$$5 \times 10$$

$$8 + (5 \times 10)$$

$$(8 + 2) - (5 \times 10)$$

$$\frac{5 \times 10}{8 - 2}$$

Lección 2

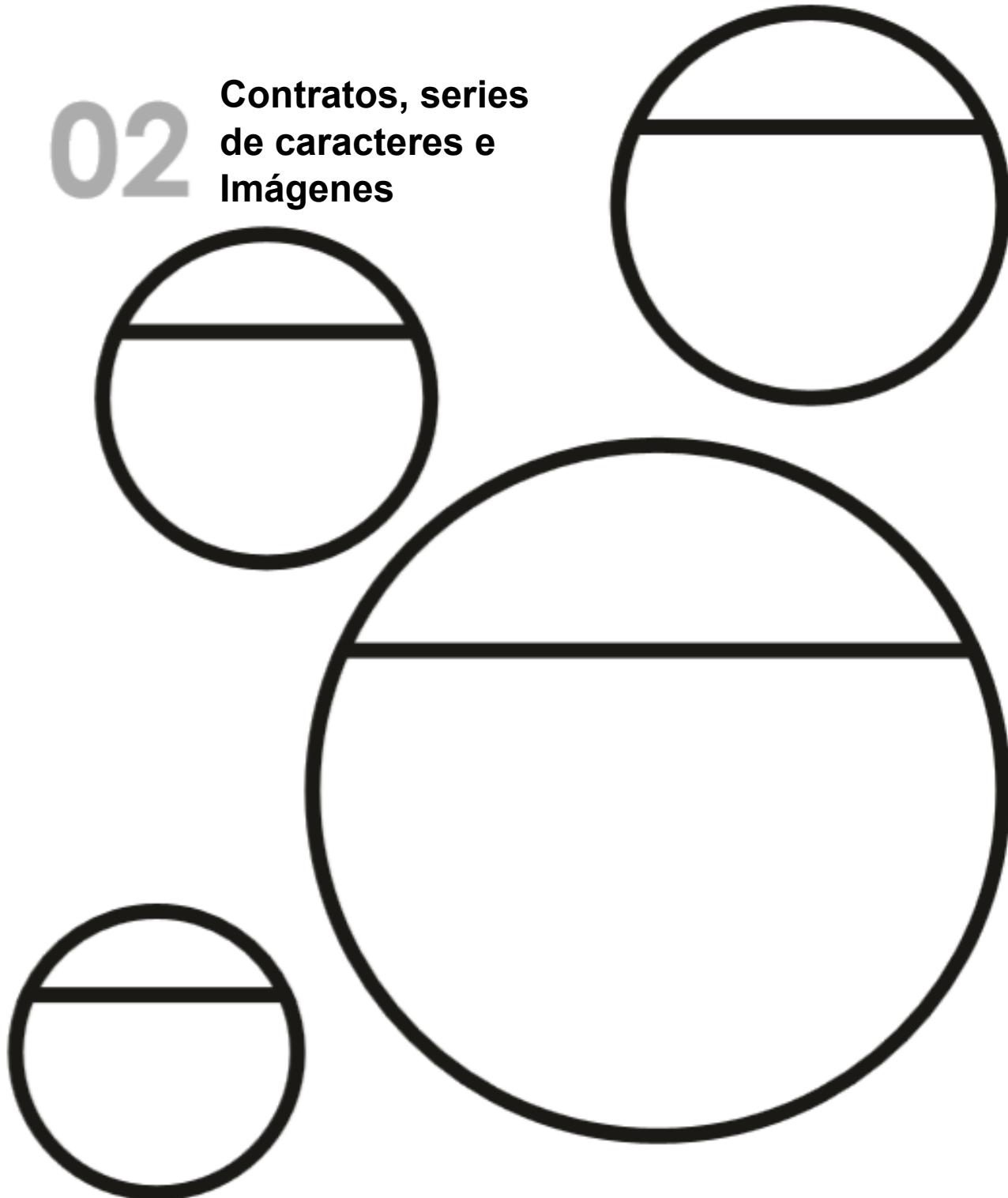
(Dibuja círculos de evaluación aquí si necesitas papel borrador adicional)

Competencia de círculos Tiempo: 5 minutos

	<i>Operación</i>	<i>Círculo de evaluación</i>	<i>Código Racket</i>
Ronda 1	$(3 * 7) - (1 + 2)$		
Ronda 2	$3 - (1 + 2)$		
Ronda 3	$3 - (1 + (5 * 6))$		
Ronda 4	$(1 + (5 * 6)) - 3$		

02

**Contratos, series
de caracteres e
Imágenes**



; _____ : _____ -> _____

nombre	dominio	rango
--------	---------	-------

(EJEMPLO (_____ _____) _____)

(EJEMPLO (_____ _____) _____)

(define (_____ _____) _____)

; _____ : _____ -> _____

nombre	dominio	rango
--------	---------	-------

(EJEMPLO (_____ _____) _____)

(EJEMPLO (_____ _____) _____)

(define (_____ _____) _____)

; _____ : _____ -> _____

nombre	dominio	rango
--------	---------	-------

(EJEMPLO (_____ _____) _____)

(EJEMPLO (_____ _____) _____)

(define (_____ _____) _____)

; _____ : _____ -> _____

nombre	dominio	rango
--------	---------	-------

(EJEMPLO (_____ _____) _____)

(EJEMPLO (_____ _____) _____)

(define (_____ _____) _____)

03

Introducción a las Definiciones



Fast Functions

; gt : number -> image

name	domain	range
(EXAMPLE (<u>gt</u> <u>500</u>)	<u>(triangle 500 "solid" "green")</u>	
(EXAMPLE (<u>gt</u> <u>7</u>)	<u>(triangle 7 "solid" "green")</u>	
(define (<u>gt</u> <u>size</u>)	<u>(triangle size "solid" "green")</u>	

; bc : number -> image

name	domain	range
(EXAMPLE (<u>bc</u> <u>19</u>)	<u>(circle 19 "solid" "blue")</u>	
(EXAMPLE (<u>bc</u> <u>43</u>)	<u>(circle 43 "solid" "blue")</u>	
(define (<u>bc</u> <u>size</u>)	<u>(circle size "solid" "blue")</u>	

; double : number -> number

name	domain	range
(EXAMPLE (<u>double</u> <u>3</u>)	<u>(* 2 3)</u>	
(EXAMPLE (<u>double</u> <u>9</u>)	<u>(* 2 9)</u>	
(define (<u>double</u> <u>num</u>)	<u>(* 2 num)</u>	

; _____ : _____ -> _____

name	domain	range
(EXAMPLE (_____ <u>_____</u>)		<u>_____</u>
(EXAMPLE (_____ <u>_____</u>)		<u>_____</u>
(define (_____ <u>_____</u>)		<u>_____</u>

Fast Functions

; _____ : _____ -> _____

name

domain

range

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

; _____ : _____ -> _____

name

domain

range

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

; _____ : _____ -> _____

name

domain

range

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

; _____ : _____ -> _____

name

domain

range

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

04

Fórmula Del Diseño



1 Contrato

2 Ejemplo

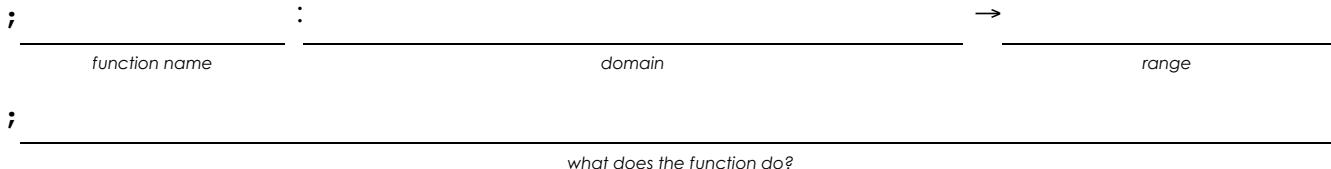
3 Definición

Problema de palabras: rocket-height

Direcciones: A rocket blasts off, traveling at 7 meters per second. Write a function called 'rocket-height' that takes in the number of seconds that have passed since the rocket took off, and which produces the height of the rocket at that time.

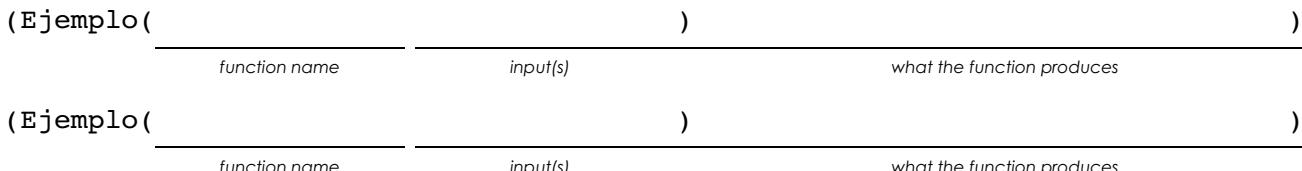
Declaración de contrato y propósito

Todo contrato tiene 3 partes...



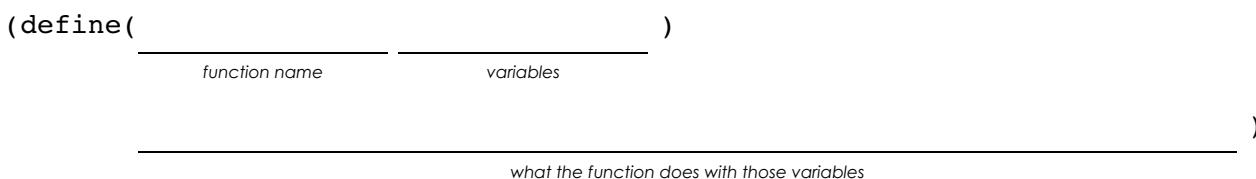
Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...



Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

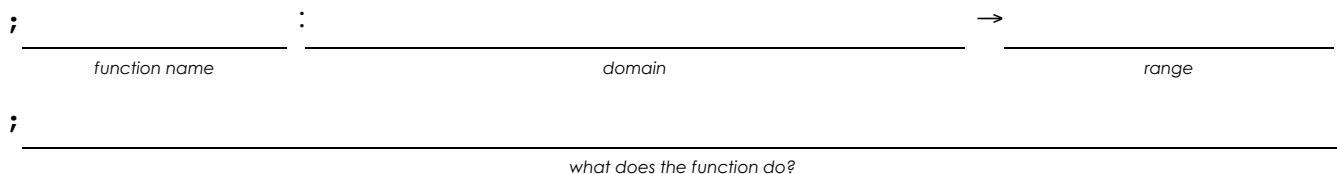


Problema de palabras: lawn-area

Direcciones: Use the Design Recipe to write a function 'lawn-area', which takes in the width and length of a lawn, and returns the area of the lawn. (Don't forget: area = length * width!)

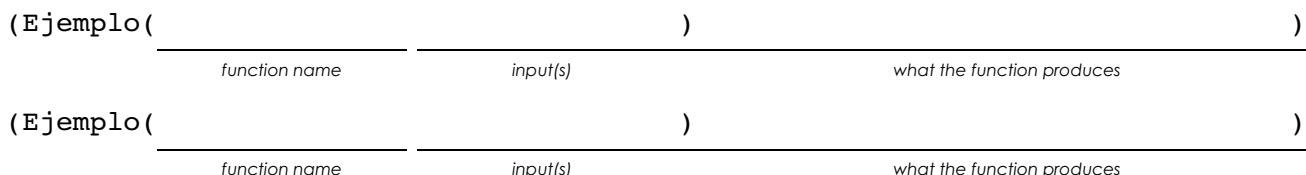
Declaración de contrato y propósito

Todo contrato tiene 3 partes...



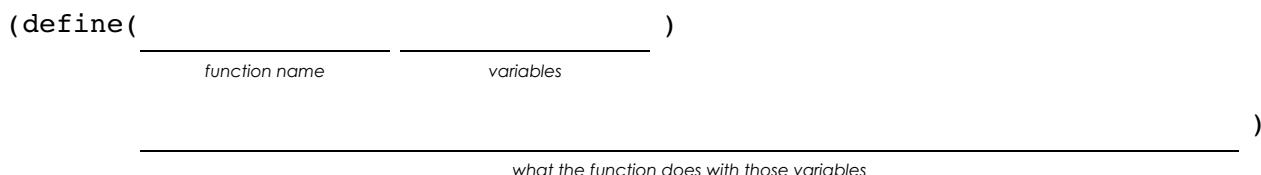
Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...



Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

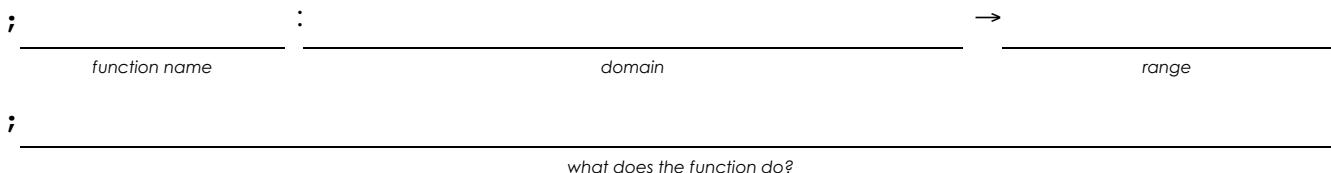


Problema de palabras: red-square

Direcciones: Use the Design Recipe to write a function 'red-square', which takes in a number (the length of each side of the square) and outputs a solid red rectangle whose length and width are the same size.

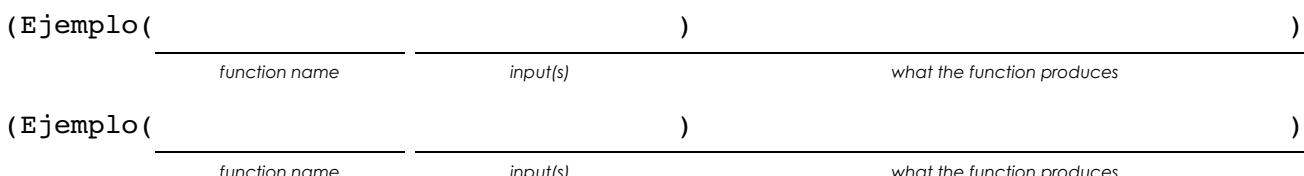
Declaración de contrato y propósito

Todo contrato tiene 3 partes...



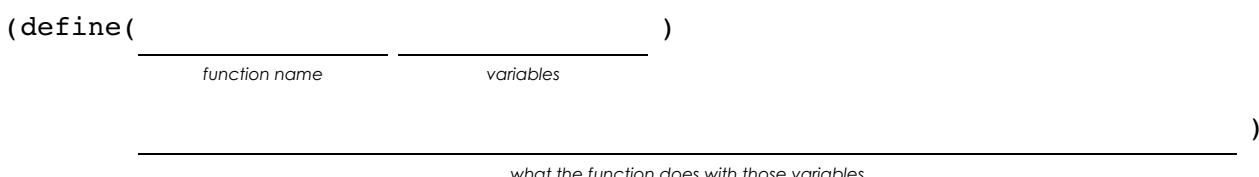
Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...



Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...



objetivo



peligro



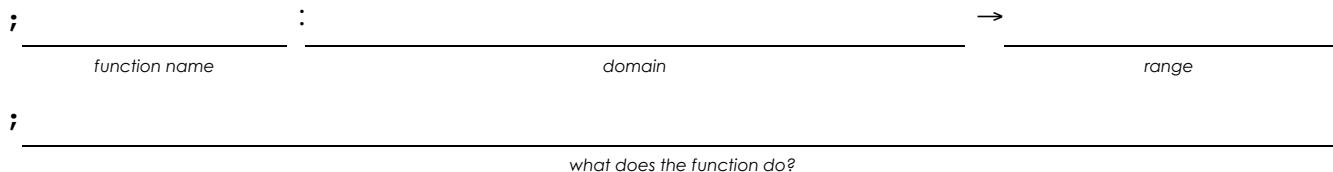
05 Animación
Del Juego

Problema de palabras: update-danger

Direcciones: Use the Design Recipe to write a function 'update-danger', which takes in the danger's x-coordinate and produces the next x-coordinate, which is 50 pixels to the left.

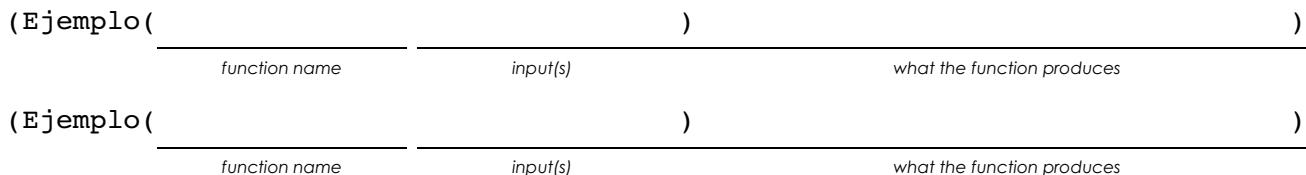
Declaración de contrato y propósito

Todo contrato tiene 3 partes...



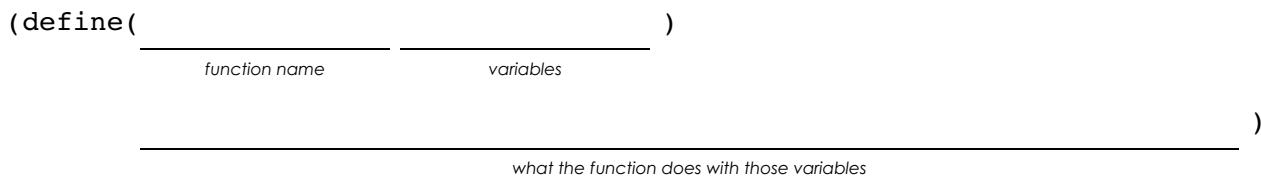
Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...



Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

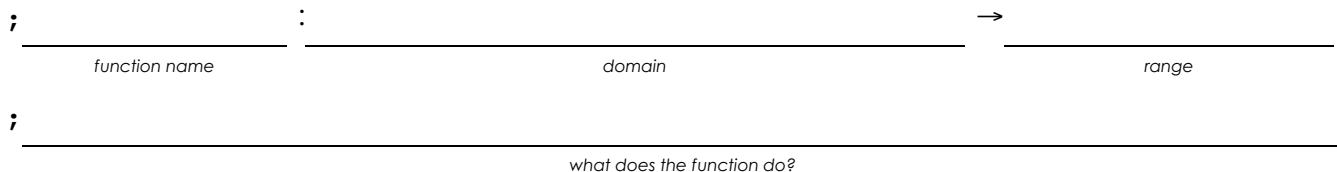


Problema de palabras: update-target

Direcciones: Write a function 'update-target', which takes in the target's x-coordinate and produces the next x-coordinate, which is 50 pixels to the right.

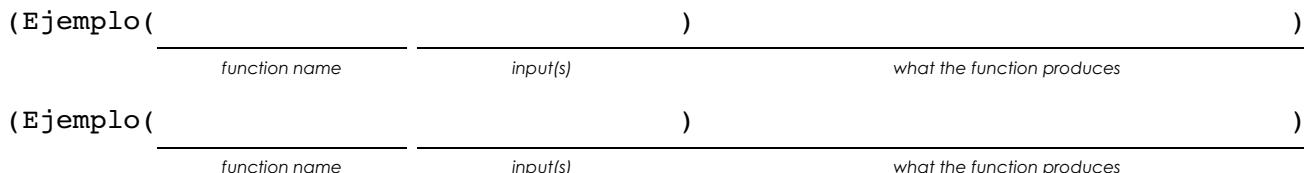
Declaración de contrato y propósito

Todo contrato tiene 3 partes...



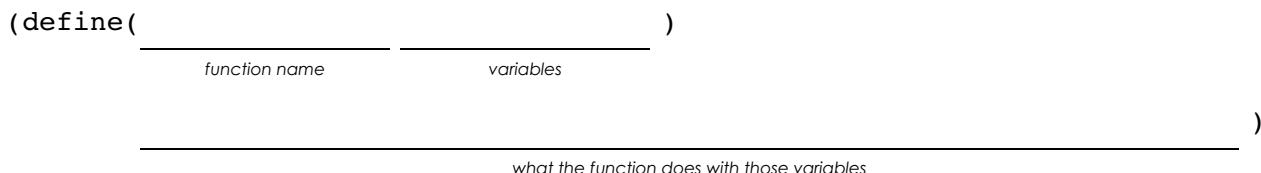
Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...



Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...





¿“Izquierda segura”?

06

**Comparando
Funciones**

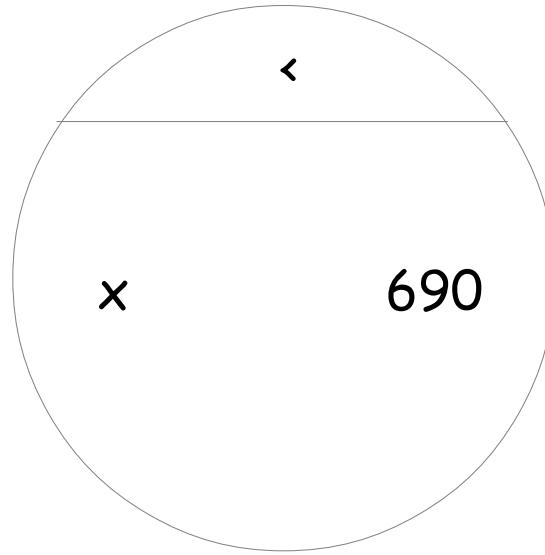
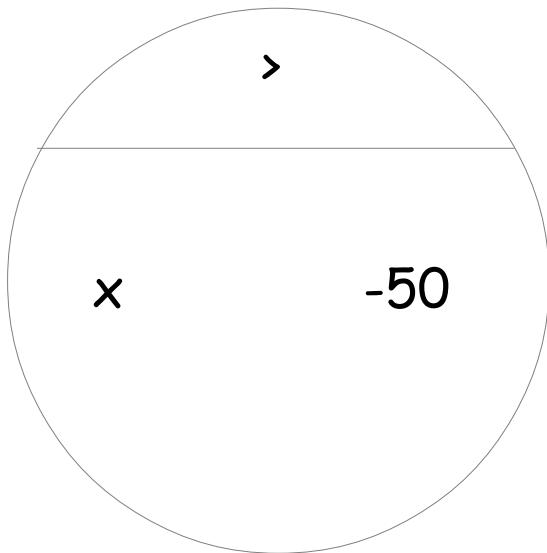
Protecting Sam

Sam is in a 640×480 yard. How far he can go to the left and right before he's out of sight?

1. A piece of Sam is still visible on the left as long as... $\underline{(> \quad x \quad -50)}$

2. A piece of Sam is still visible on the right as long as... $\underline{(< \quad x \quad 690)}$

3. Draw the Circle of Evaluation for these two expressions in the circles below:

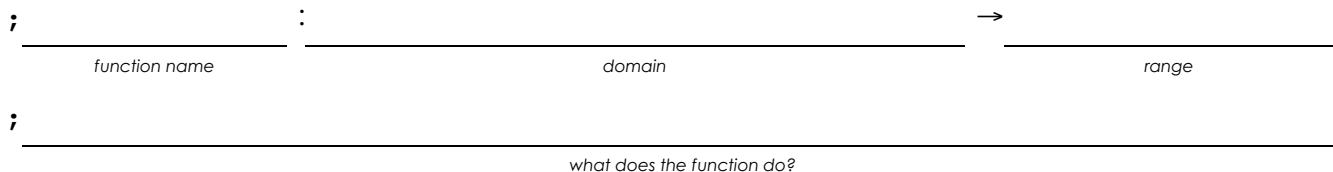


Problema de palabras: safe-left?

Direcciones: Use the Design Recipe to write a function 'safe-left?', which takes in an x-coordinate and checks to see if it is greater than -50

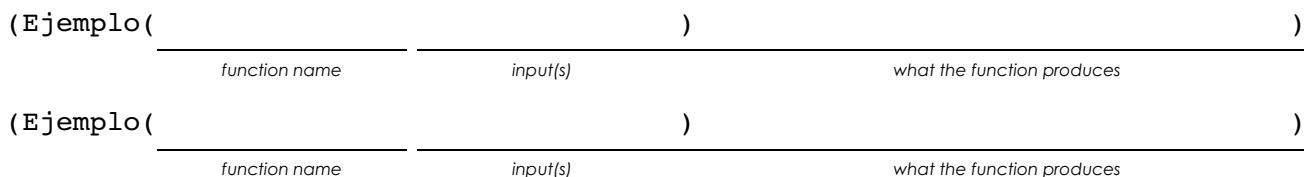
Declaración de contrato y propósito

Todo contrato tiene 3 partes...



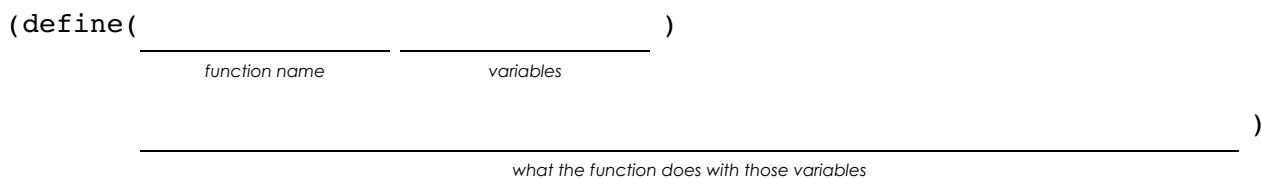
Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...



Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

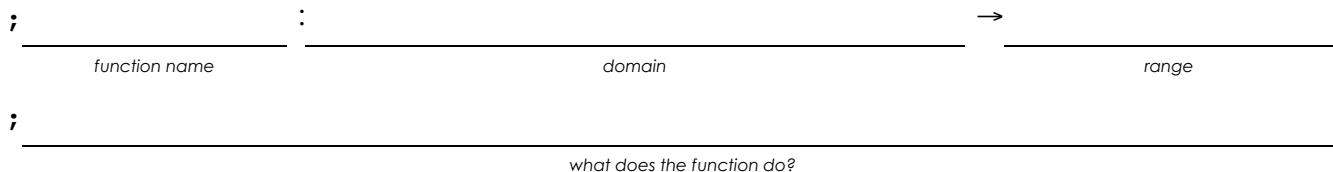


Problema de palabras: safe-right?

Direcciones: Use the Design Recipe to write a function 'safe-right?', which takes in an x-coordinate and checks to see if it is less than 690.

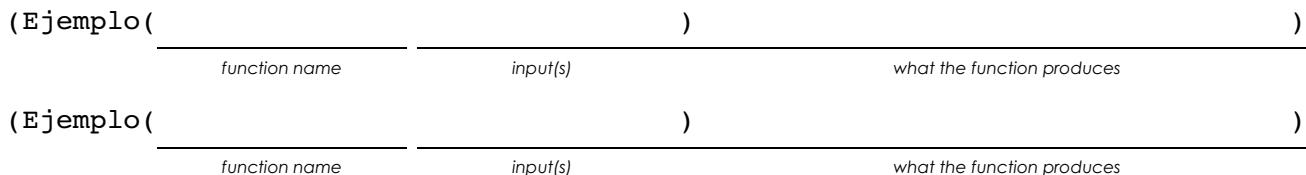
Declaración de contrato y propósito

Todo contrato tiene 3 partes...



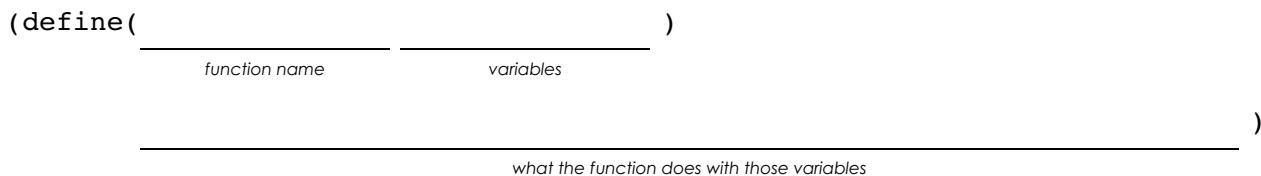
Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...



Definición

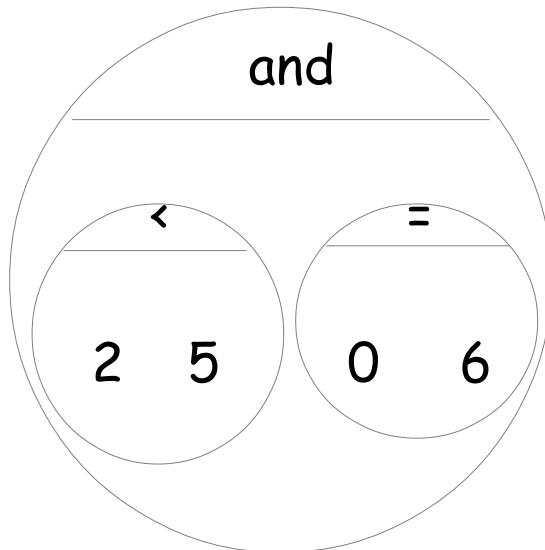
Escribe la definición, nombres de variables a todos sus valores de entrada...



and / or

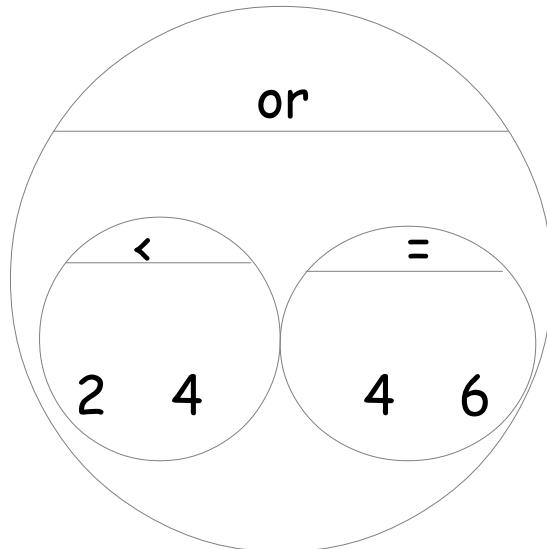
Write the Circles of Evaluation for these statements, and then convert them to Racket

1. Two is less than five, and zero is equal to six.



(**and** (< 2 5) (= 0 6))

2. Two is less than four or four is equal to six.



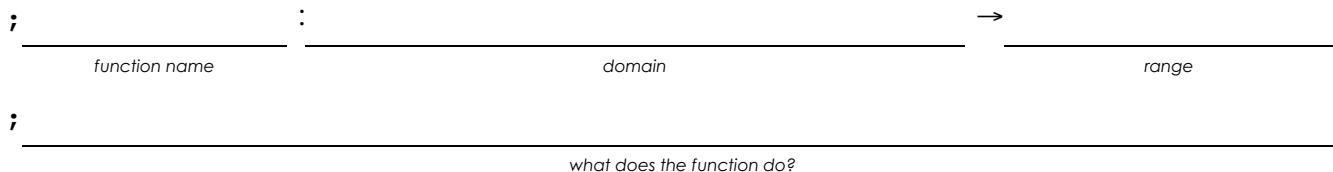
(**or** (< 2 4) (= 4 6))

Problema de palabras: onscreen?

Direcciones: Use the Design Recipe to write a function 'onscreen?', which takes in the x-coordinate and checks to see if Sam is safe on the left AND safe on the right.

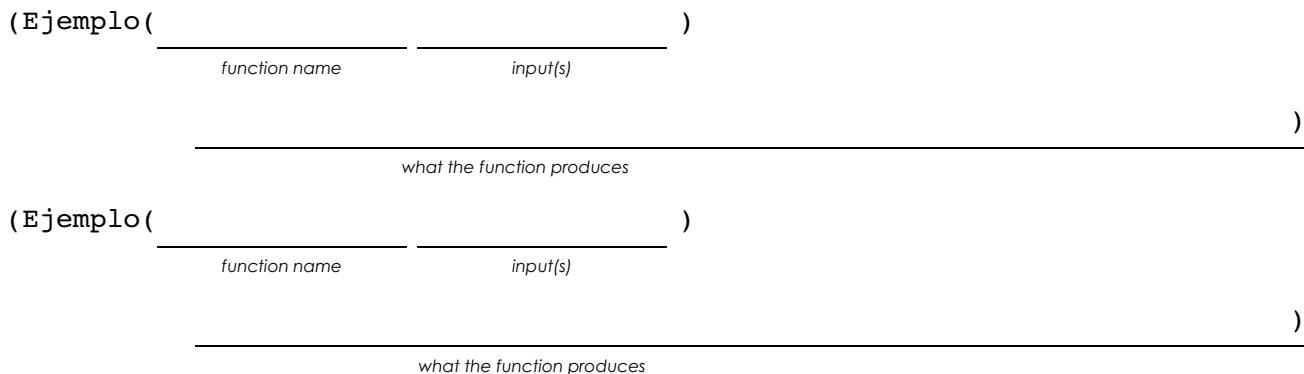
Declaración de contrato y propósito

Todo contrato tiene 3 partes...



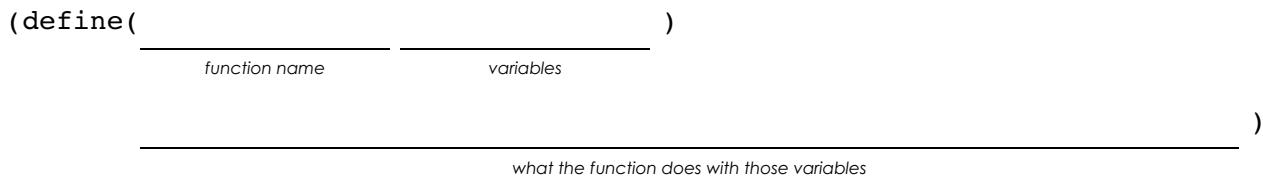
Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

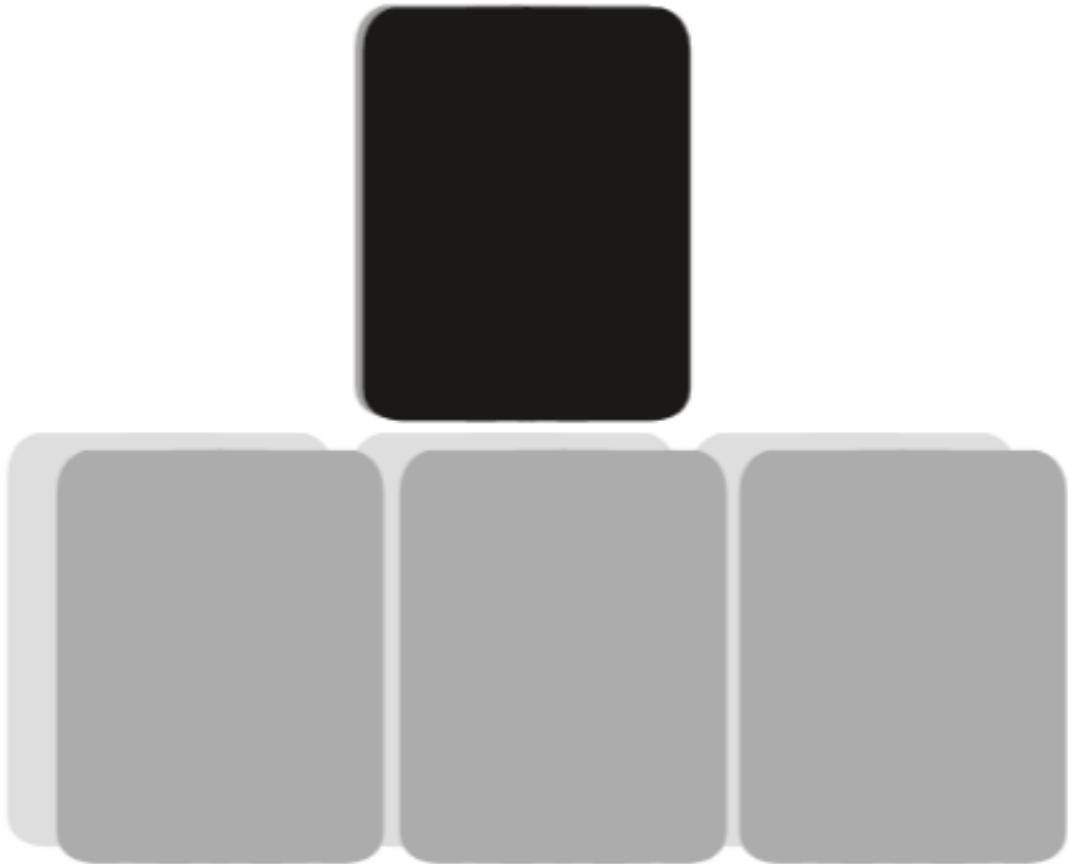


Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...



07 Bifurcación Condicional

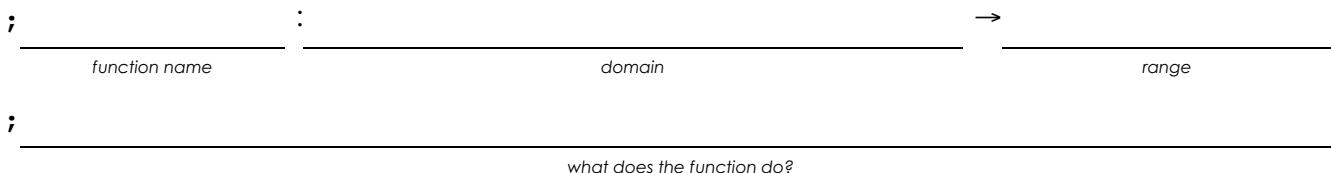


Problema de palabras: cost

Direcciones: Luigi's Pizza has hired you as a programmer. They offer Pepperoni (\$10.50), Cheese (\$9.00), Chicken (\$11.25) and Broccoli (\$10.25). Write a function called `cost` which takes in the name of a topping and outputs the cost of a pizza with that topping.

Declaración de contrato y propósito

Todo contrato tiene 3 partes...



Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(cost	"pepperoni")
function name	input(s)		what the function produces
(Ejemplo())
function name	input(s)		what the function produces
(Ejemplo())
function name	input(s)		what the function produces

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

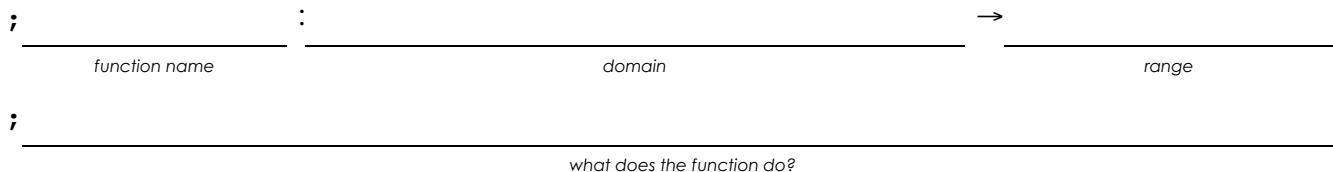
(define()
function name	variables	
(cond)
[]
[]
[]
[]
[))

Problema de palabras: update-player

Direcciones: Write a function called *update-player*, which takes in the player's y-coordinate and the name of the key pressed, and returns the new y-coordinate.

Declaración de contrato y propósito

Todo contrato tiene 3 partes...



Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(update-player	320 "up"))
	function name	input(s)	what the function produces
(Ejemplo(update-player	100 "up"))
	function name	input(s)	what the function produces
(Ejemplo())
	function name	input(s)	what the function produces
(Ejemplo())
	function name	input(s)	what the function produces

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

(define())
	function name	variables	
(
[]
[]
[))

08 Detección de Colisiones

colisión



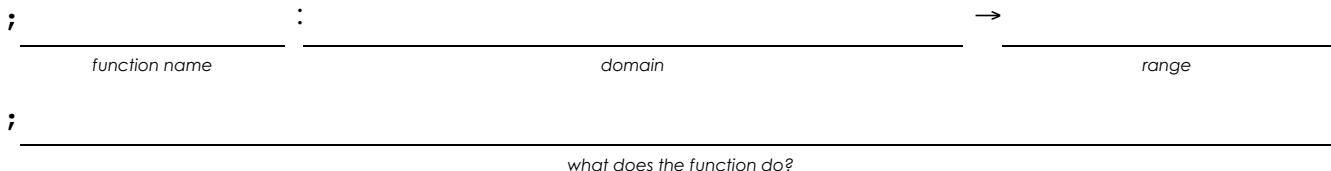
distancia

Problema de palabras: line-length

Direcciones: Write a function called 'line-length', which takes in two numbers and returns the *positive difference* between them. It should always subtract the smaller number from the bigger one, and if they are equal it should return zero.

Declaración de contrato y propósito

Todo contrato tiene 3 partes...



Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(line-length	10 5) (- 10 5))
	function name	input(s)	what the function produces
(Ejemplo(line-length	2 8) (- 8 2))
	function name	input(s)	what the function produces

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

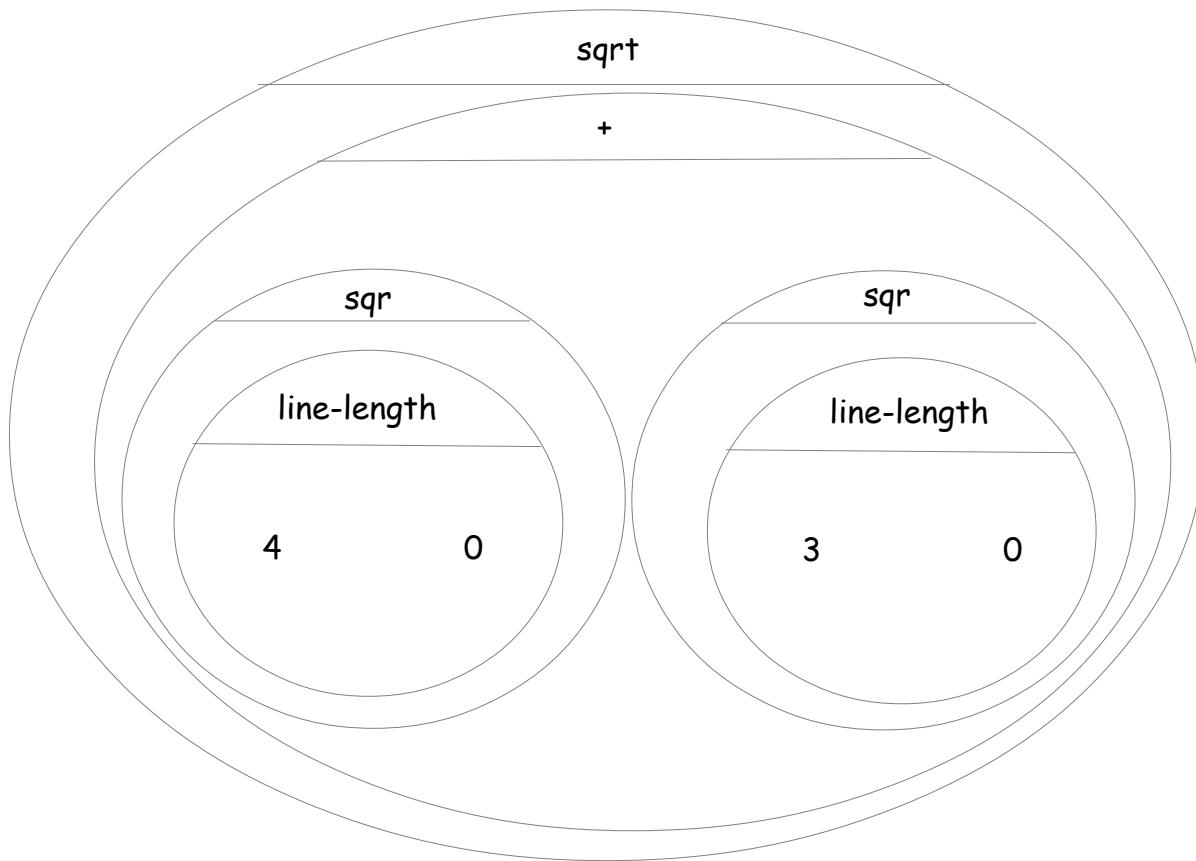
```
(define( _____ )  
  _____  
(cond  
  _____  
 [ _____ ] )  
 [ _____ ] ))
```

The Distance Formula (an example)

The distance between the points (0, 0) and (4, 3) is given by:

$$\sqrt{(line-length\ 4\ 0)^2 + (line-length\ 3\ 0)^2}$$

Convert the formula above into a Circle of Evaluation (We've already gotten you started!)



Convert the Circle of Evaluation into Racket code:

```
(sqrt (+ (sqr (line-length 4 0))
          (sqr (line-length 3 0)))))
```

Problema de palabras: distance

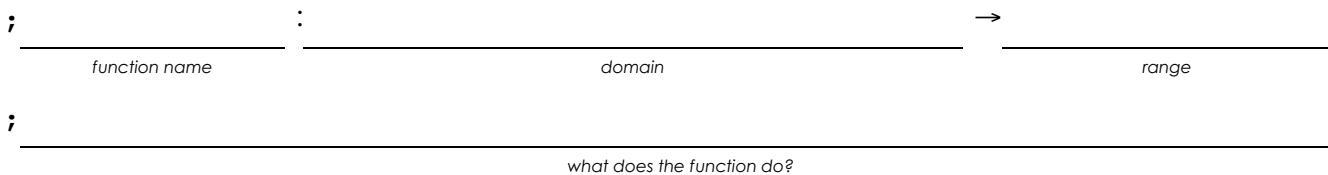
Direcciones: Write a function *distance*, which takes FOUR inputs:

- *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. (HINT: look at what you did on the previous page!)

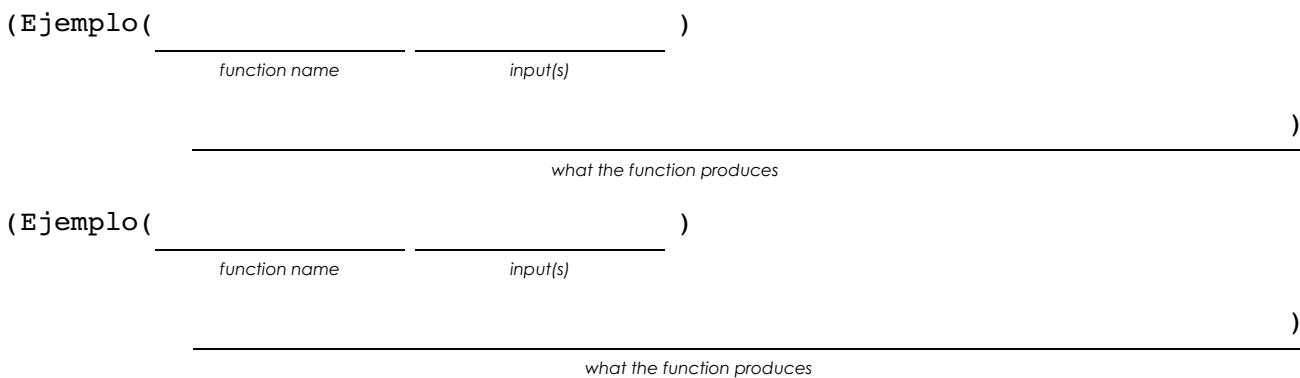
Declaración de contrato y propósito

Todo contrato tiene 3 partes...



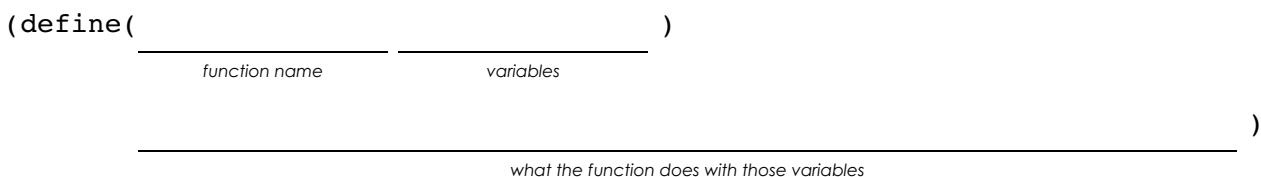
Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...



Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...



Problema de palabras: collide?

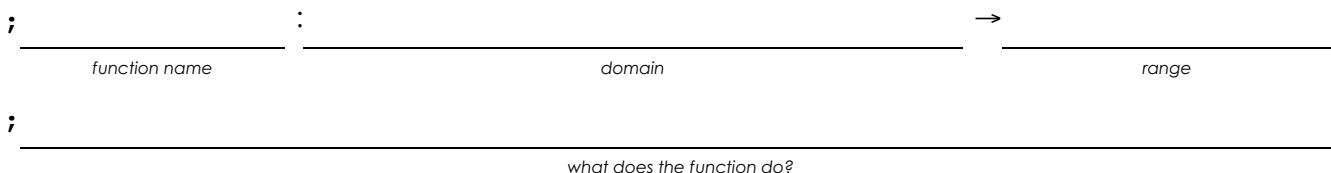
Direcciones: Write a function `collide?`, which takes FOUR inputs:

- `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

Are the coordinates of the player within 50 pixels of the coordinates of the other character?

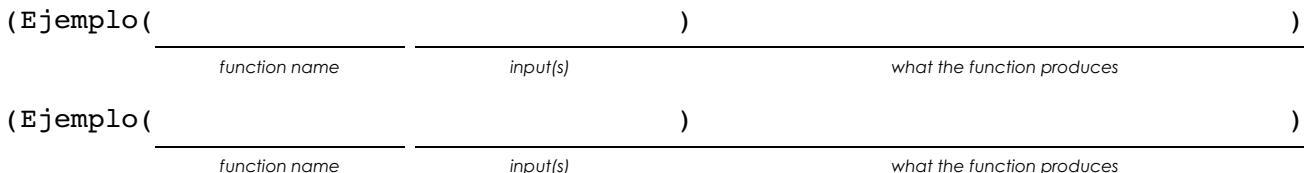
Declaración de contrato y propósito

Todo contrato tiene 3 partes...



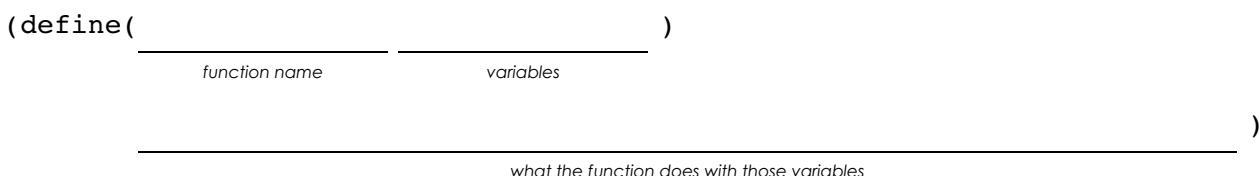
Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...



Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...





09 Preparación de la presentación



Lesson 9

Catchy Intro: Feel like you never get enough to eat? So does Leo. Come catch your prey, and escape the zookeeper!

Name, Age, Grade: Jessica Programmer, 12, 7th grade

Game Title: Run for your Supper

Back Story:One day, a young lion was sitting in his cage. He saw an escaped gazelle come running past. It was lunch time, and he was hungry, so he leapt out to catch food. He has to run fast to grab food and escape the evil zookeeper.

Characters: Player: Leo the lion.

Danger: Zoe Zookeeper.

Target: Gary Gazelle

Explain a piece of your code: My update-danger function takes in the current x coordinate of the gazelle, and adds 50 to it. This moves the gazelle 50 pixels to the right.

Presentation Feedback

For each question, circle the answer that fits best.

Was the introduction catchy? No way! A little. Definitely!

Did they talk about their characters? No way! A little. Definitely!

Did they explain the code well? No way! A little. Definitely!

Did they speak slowly enough? No way! A little. Definitely!

Did they speak loudly enough? No way! A little. Definitely!

Were they standing confidently? No way! A little. Definitely!

Did they make eye contact? No way! A little. Definitely!

Presentation Feedback

For each question, circle the answer that fits best.

Was the introduction catchy? No way! A little. Definitely!

Did they talk about their characters? No way! A little. Definitely!

Did they explain the code well? No way! A little. Definitely!

Did they speak slowly enough? No way! A little. Definitely!

Did they speak loudly enough? No way! A little. Definitely!

Were they standing confidently? No way! A little. Definitely!

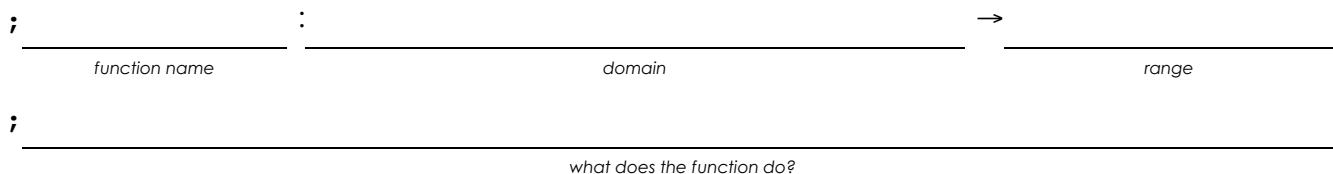
Did they make eye contact? No way! A little. Definitely!

Problema de palabras: red-shape

Direcciones: Write a function called red-shape, which takes in the name of a shape and draws that shape (solid and red). Add an else clause that produces a sensible output.

Declaración de contrato y propósito

Todo contrato tiene 3 partes...



Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(<u>red-shape</u>	"circle")	(circle 50 "solid" "red"))
	function name	input(s)		what the function produces	
(Ejemplo())
	function name	input(s)		what the function produces	
(Ejemplo())
	function name	input(s)		what the function produces	
(Ejemplo())
	function name	input(s)		what the function produces	

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada....

```
(define( _____ )  
  _____  
  
(cond  
  _____  
  
  [ _____ (circle 50 "solid" "red") ]  
  
  [ _____ ]  
  
  [ _____ ]  
  
  [ _____ ]  
  
  [ _____ ]))
```

Translating into Algebra

Value Definitions

Racket Code	Algebra
(define x 10)	$x = 10$
(define y (* x 2))	$y = x \cdot 2$
(define z (+ x y))	$z = x + y$
(define age 14)	$age = 14$
(define months (* age 12))	$months = age \cdot 12$
(define days (* months 30))	$days = months \cdot 30$
(define hours (* days 24))	$hours = days \cdot 24$
(define minutes (* hours 60))	$minutes = hours \cdot 60$

Function Definitions

Racket Code	Algebra
(define (area length width) (* length width))	$area(length, width) = length \cdot width$
(define (circle-area radius) (* pi (sqr radius)))	$circle-area(radius) = \pi \cdot radius^2$
(define (distance x1 y1 x2 y2) (sqrt (+ (sqr (- x1 x2)) (sqr (- y1 y2))))))	$distance(x_1, y_1, x_2, y_2) = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

Design Recipe

A rocket is flying from Earth to Mars at 80 miles per second. Write a function that describes the **distance** D that the rocket has traveled, as a function of **time** t .

I. Contract+Purpose Statement

Every contract has three parts:

$; \underline{D} :$	Number	\rightarrow	Number
	name	Domain	Range
$; \underline{\text{Given the number of seconds, produce the height of the rocket if it moves at 80mi/sec}}$			<i>What does the function do?</i>

II. Give Examples

Write an example of your function for some sample inputs

$$D(1) = 80 * 1$$

Use the function here

What should the function produce?

$$D(2) = 80 * 2$$

Use the function here

What should the function produce?

$$D(3) = 80 * 3$$

Use the function here

What should the function produce?

$$D(4) = 80 * 4$$

Use the function here

What should the function produce?

III. Definition

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

$$D(\text{time}) = 80 * \text{time}$$

Design Recipe

A rocket is traveling from Earth to Mars at 80 miles per second. Write a function that describes the time the rocket has been traveling, as a function of distance.

I. Contract+Purpose Statement

Every contract has three parts:

;	time	:	Number	->	Number
	name		Domain		Range
;	Given the distance, produce the time-traveled if it moves at 80mi/sec				
	What does the function do?				

II. Give Examples

Write an example of your function for some sample inputs

time(0) = 0/80

Use the function here	What should the function produce?
-----------------------	-----------------------------------

time(10) = 10/80

Use the function here	What should the function produce?
-----------------------	-----------------------------------

time(80) = 80/80

Use the function here	What should the function produce?
-----------------------	-----------------------------------

time(190) = 190/80

Use the function here	What should the function produce?
-----------------------	-----------------------------------

III. Definition

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

$$\text{time}(\text{distance}) = \text{distance}/80$$

Design Recipe

A rocket leaves Earth, headed for Mars at 80 miles per second. **At the exact same time**, an asteroid leaves Mars traveling towards Earth, moving at 70 miles per second. If the distance from the Earth to Mars is 50,000,000 miles, how long will it take for them to meet?

I. Contract+Purpose Statement

Every contract has three parts:

; **collide** : **Number** -> **Number**

name	Domain	Range
------	--------	-------

; Given the distance between a rocket (moving at 80mi/sec) & asteroid (70mi/sec), when will they collide?
What does the function do?

II. Give Examples

Write an example of your function for some sample inputs

collide(0) = 0/150

Use the function here What should the function produce?

`collide(150) = 150/150`

Use the function here What should the function produce?

`collide(700) = 700/150`

Use the function here What should the function produce?

`collide(50,000,000) = 50,000,000/150`

Use the function here What should the function produce?

III. Definition

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

`collide(distance-between) = distance-between/150`

Design Recipe

I. Contract+Purpose Statement

Every contract has three parts:

;
; _____
What does the function do?

II. Give Examples

Write an example of your function for some sample inputs

=

Use the function here What should the function produce?

=

Use the function here	What should the function produce?
-----------------------	-----------------------------------

=
Use the function here What should the function produce?

III. Definition

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

Design Recipe

I. Contract+Purpose Statement

Every contract has three parts:

;
; _____
What does the function do?

II. Give Examples

Write an example of your function for some sample inputs

=

Use the function here What should the function produce?

=

Use the function here What should the function produce?

=
Use the function here What should the function produce?

III. Definition

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

Contracts

Contracts