Nombre: _____

# BOOTSTRAP

www.bootstrapworld.org

**Libro de trabajo del estudiante**

Clase: _____


Libro de trabajo v2.7

Traído para ti por el equipo de Bootstrap:

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# Unidades de Bootstrap

01 Videojuegos y Planos de Coordenadas

02 Contratos, series de caracteres e Imágenes

03 Introducción a las Definiciones

04 Fórmula del Diseño

05 Animación Del Juego

06 Comparando Funciones

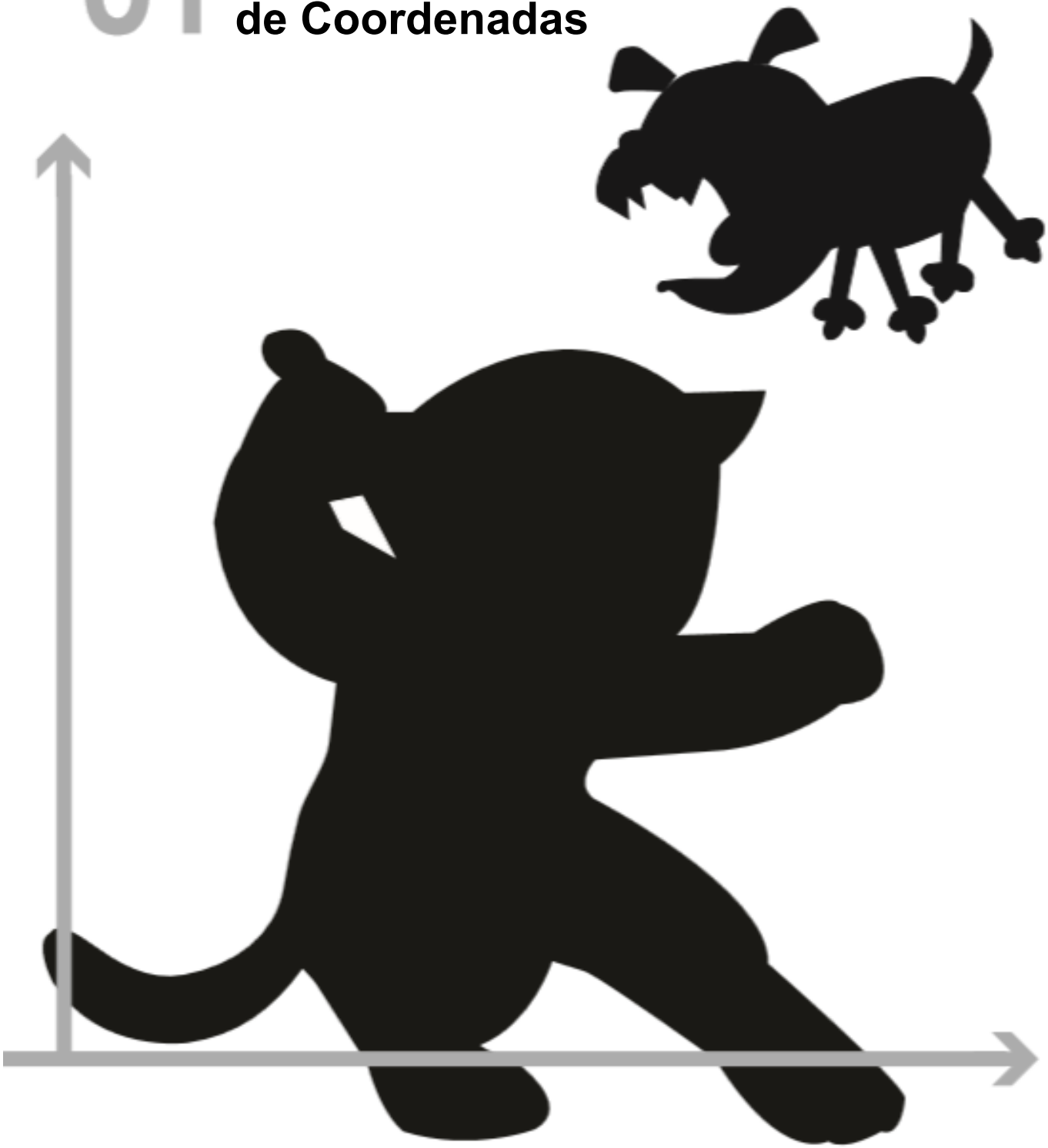
07 Bifurcación Condicional

08 Detección de Colisiones

09 Preparándonos para el Lanzamiento

10 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 x 10* | | |
| *8 + (5 x 10)* | | |
| *(8 + 2) - (5 x 10)* | | |
| $\frac{5 \times 10}{8 - 2}$ | | |

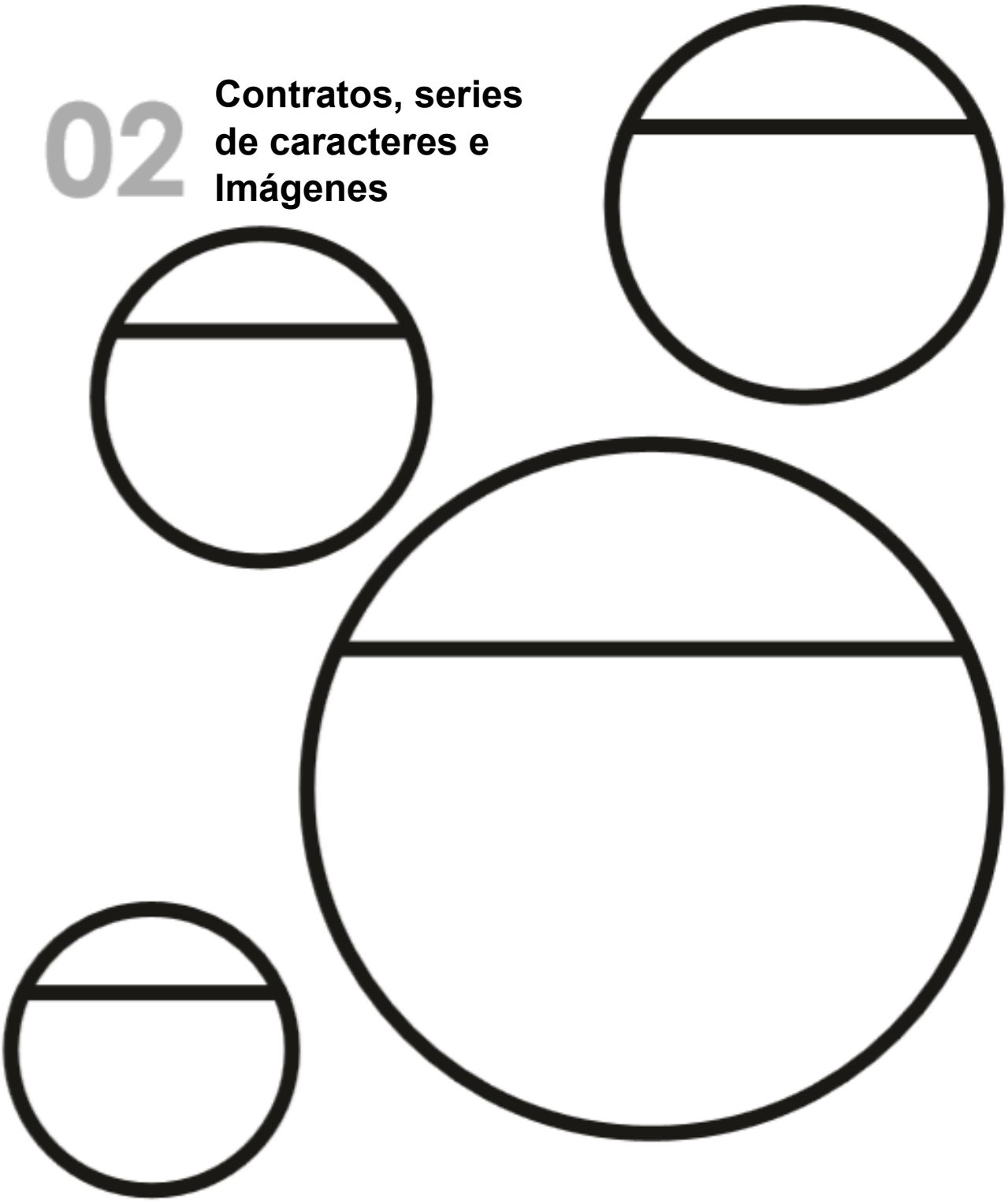
# Lección 2

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

# Competencia de círculos Tiempo: 5 minutos

| | ***Operación*** | ***Círculo de evaluación*** | ***Código Racket*** |
|---|---|---|---|
| *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 (_____ _____) _____)

---

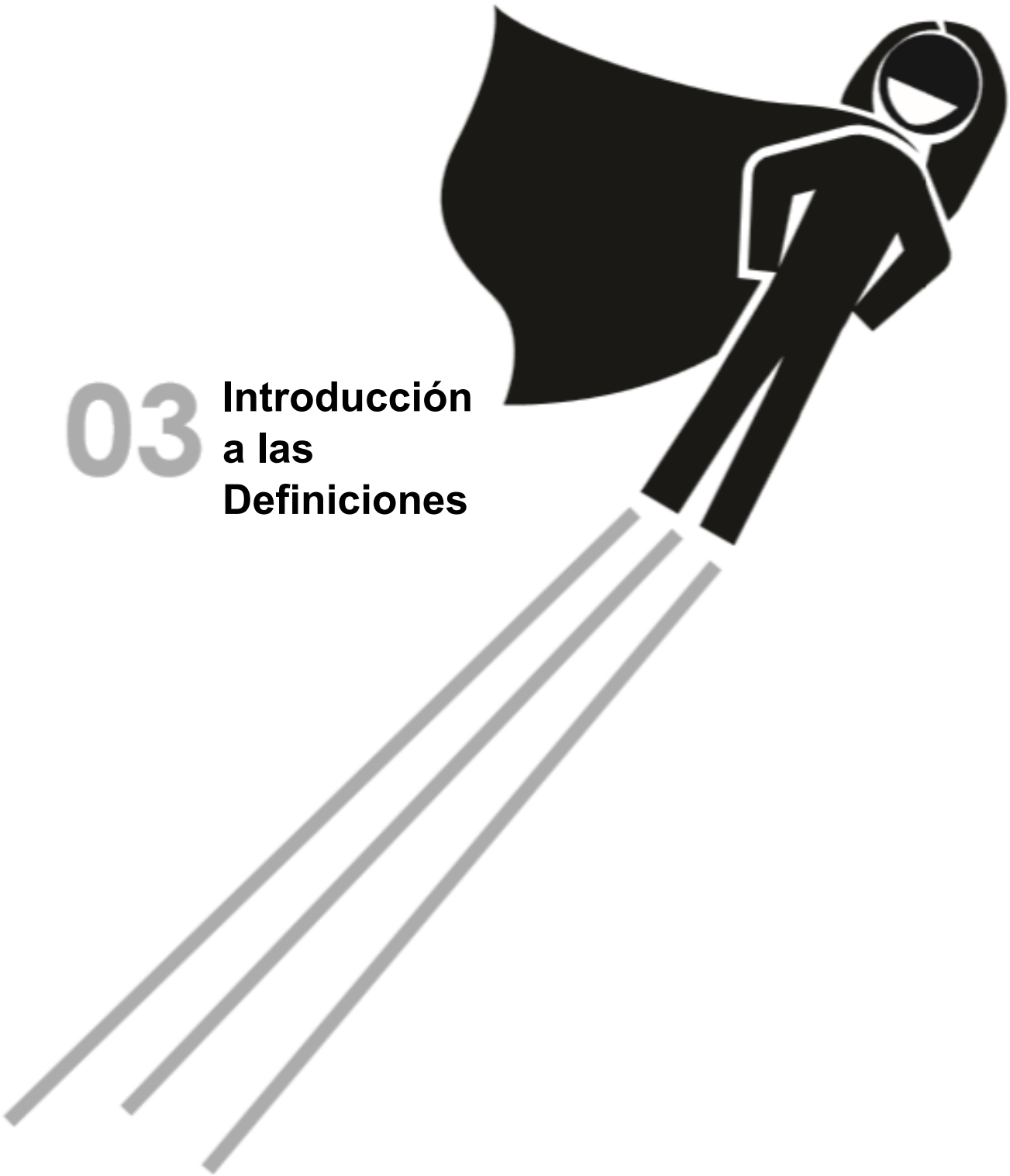
; _____:_____ -> _____

nombre dominio rango

(EJEMPLO (_____ _____) _____)

(EJEMPLO (_____ _____) _____)

(define (_____ _____) _____)



# 03 Introducción a las Definiciones

# Fast Functions

; _____:_____ -> _____

name domain range

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

---

; _____:_____ -> _____

name domain range

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

---

; _____:_____ -> _____

name domain range

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

---

; _____:_____ -> _____

name domain range

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

# 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...*

; _____ : _____ → _____

*function name* *domain* *range*

; _____

*what does the function do?*

### Ejemplos

*Escribe algunos ejemplos, luego elevala y marca las cumbres...*

(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*

_____)

*what the function does with these variables*

## 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

*Este contrato tiene 3 partes...*

; _____ : _____ → _____

*function name* *domain* *range*

; _____

*what does the function do?*

### Ejemplos

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

(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( _____ _____ )

_____ )

*what the function does with these variables*

## 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

*Este contrato tiene 3 partes...*

; _____ : _____ → _____

; _____

*what does the function do?*

### Ejemplos

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

(Ejemplo( _____ _____ ) _____ )

(Ejemplo( _____ _____ ) _____ )

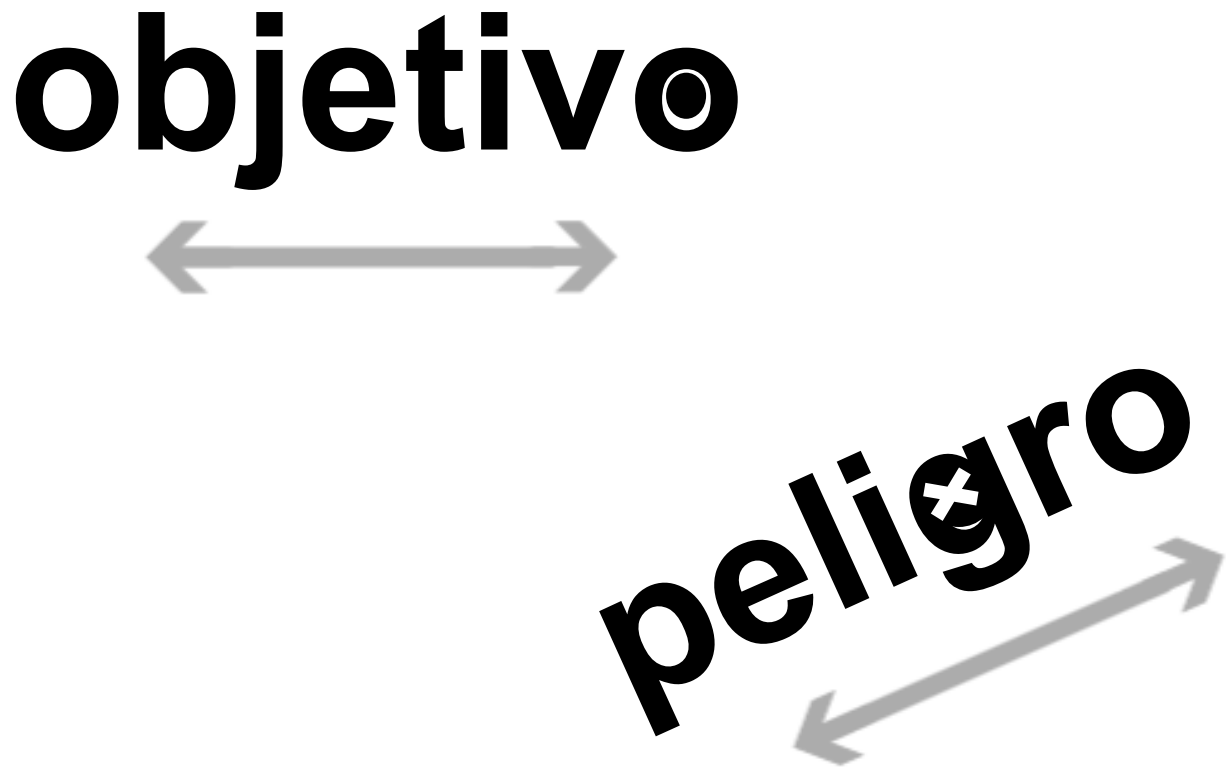
### Definición

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

(define( _____ _____ )

_____ )

*what the function does with these variables*




## 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

*Este contrato tiene 3 partes...*

; _____ : _____ → _____

*function name* *domain* *range*

; _____

*what does the function do?*

### Ejemplos

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

(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( _____ _____ )

_____ )

*what the function does with these variables*

## 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

*Este contrato tiene 3 partes...*

; _____ : _____ → _____

*function name* *domain* *range*

; _____

*what does the function do?*

### Ejemplos

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

(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* *variable*

*what the function does with these variables*

¿“Izquierda segura”?

# 06 Comparando Funciones

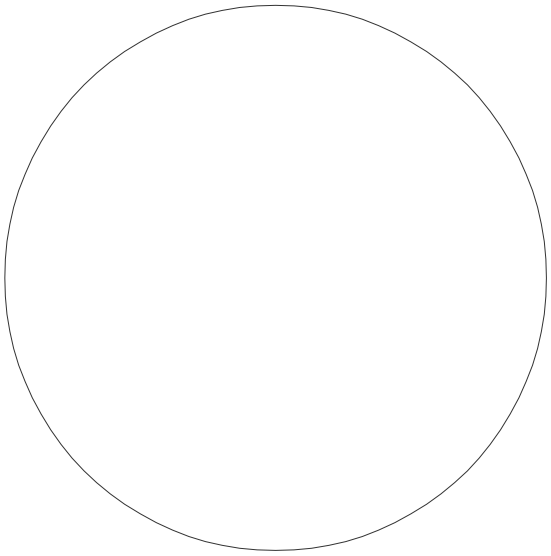
# Design Recipe

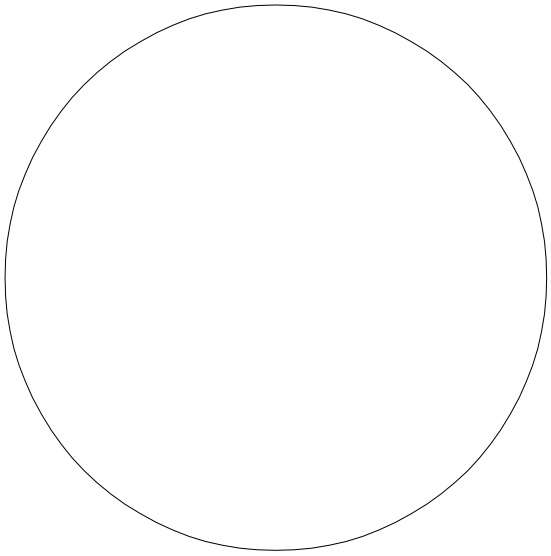
Sam is in a 640 x 480 yard. How far he can go to the left and right before he's out of sight?

1. A piece of Sam is still visible on the left as long as... `(> x -50)`

2. A piece of Sam is still visible on the right as long as... _____

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**

*Este contrato tiene 3 partes...*

; _____ : _____ → _____

*function name* *dominio* *rango*

; _____

*what does the function do?*

**Ejemplos**

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

(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( _____ _____ )

_____ )

*what the function does with these variables*

## 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

*Este contrato tiene 3 partes...*

; _____ : _____ → _____

*function name* *dominio* *rango*

; _____

*what does the function do?*

### Ejemplos

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

(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( _____ _____ )

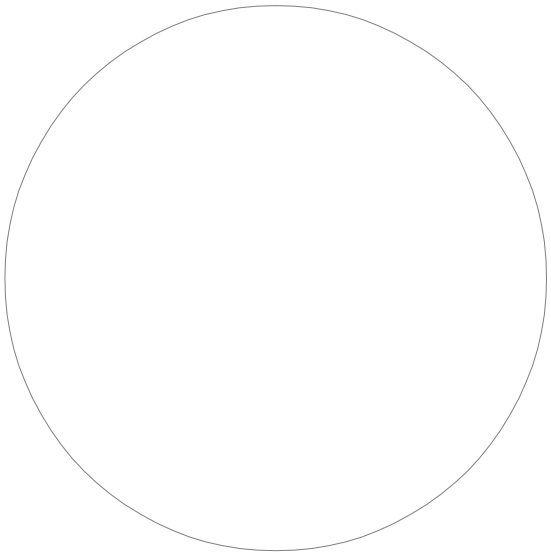
_____ )

*what the function does with these variables*

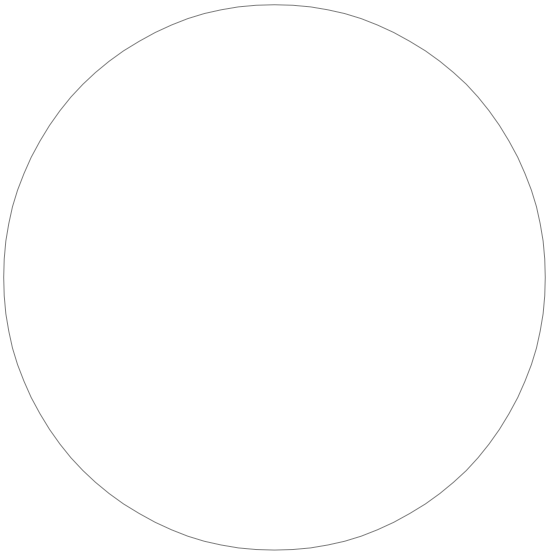
# and / or

**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.



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



**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**

*Este contrato tiene 3 partes...*

**;** _____ : _____ → _____

*function name* *dominio* *rango*

**;** _____

*what does the function do?*

**Ejemplos**

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

**(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...*

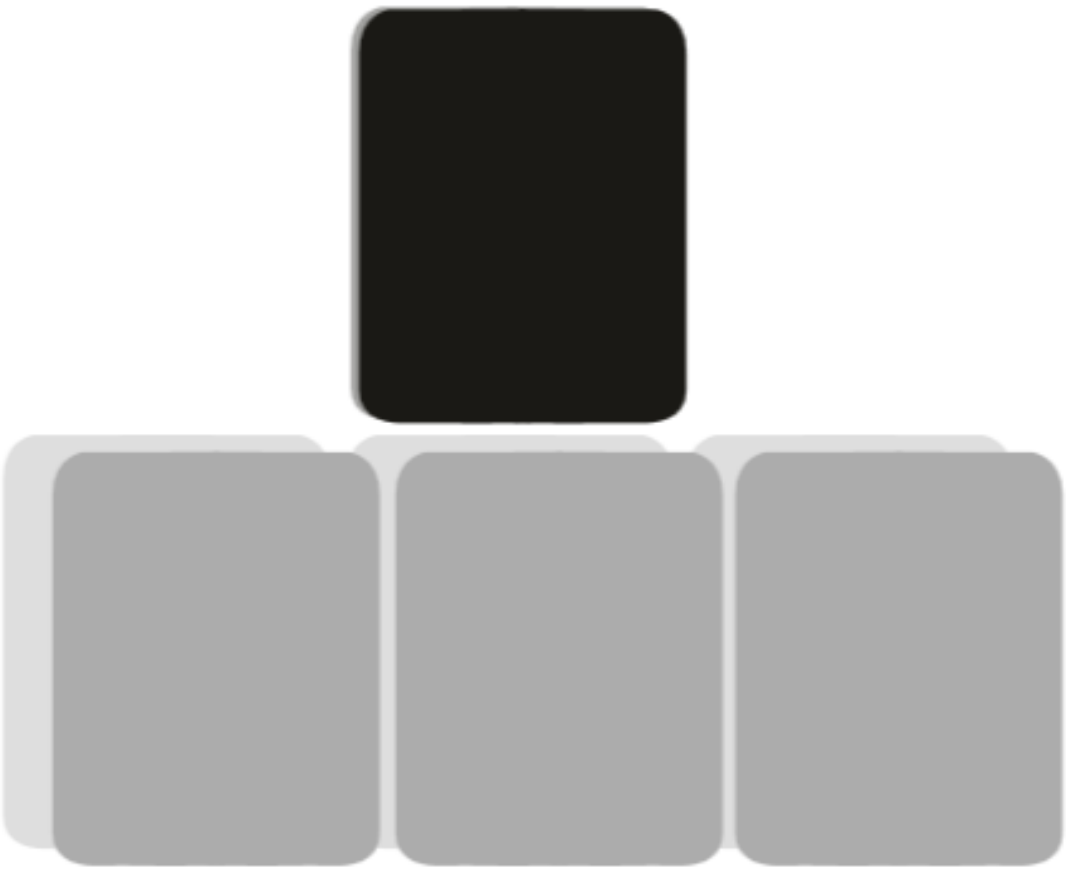
**(define(** _____ _____ **)**

*function name* *variables*

_____ **)**

*what the function does with these variables*

# 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...*

; _____ : _____ → _____
*function name* *domain* *range*

; _____
*what does the function do?*

### Ejemplos

*Escribe algunos ejemplos, luego ejecuta 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*

(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

*Este contrato tiene 3 partes...*

; _____ : _____ → _____

*function name* *domain* *range*

; _____

*what does the function do?*

### 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 elevala y marca los cambios...*

(Ejemplo( line-length 10 5 ) (- 10 5) )

(Ejemplo( line-length 2 8 ) (- 8 2) )

### Definición

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

(define( _____ _____ )

(cond

[ _____ _____ ]

[ _____ _____ )))

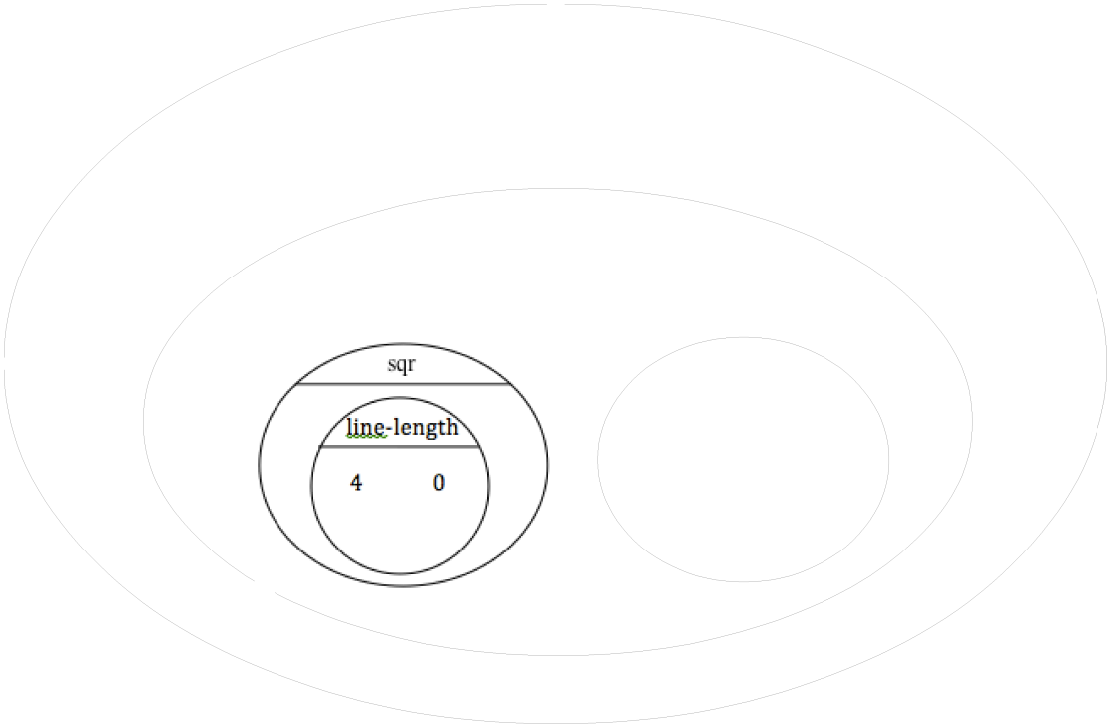
# The Distance Formula (an example)

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

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

---

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




---

Convert the Circle of Evaluation into Racket code:

## 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:...*

; _____ : _____ → _____

*function name* *domain* *range*

; _____

*what does the function do?*

### Ejemplos

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

(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*

_____ )

*what the function does with these variables*

## 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

*Este contrato toma 3 partes...*

; _____ : _____ → _____

*function name* *domain* *range*

; _____

*what does the function do?*

### Ejemplos

*Escribe algunos ejemplos, luego rízalos y marca los cambios...*

(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*

_____ )

*what the function does with these variables*

# 09 Preparación de la presentación

# Lesson 9

Catchy Intro:

Name, Age, Grade:

Game Title:

Back Story:

Characters:

Explain a piece of your code:

# 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! |
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| 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

*Este contrato tiene 3 partes...*

; _____ : _____ → _____

*function name* *domain* *range*

; _____

*what does the function do?*

### Ejemplos

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

(Ejemplo( `red-shape` `"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( _____ _____ )

*function name* *variables*

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

# Translating into Algebra

## Value Definitions

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

## Function Definitions

| Racket Code | Algebra |
|---|---|
| `(define (area length width)`<br>`  (* length width))` | area(length, width) = length * width |
| `(define (circle-area radius)`<br>`  (* pi (sqr radius)))` | |
| `(define (distance x1 y1 x2 y2)`<br>`  (sqrt (+ (sqr (- x1 x2))`<br>`  (sqr (- y1 y2)))))` | |

# 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:

; D : _____ -> _____

name Domain Range

; _____

*What does the function do?*

## II. Give Examples

Write an example of your function for some sample inputs

D( 1 ) =

Use the function here What should the function produce?

D( 2 ) =

Use the function here What should the function produce?

D( ) =

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.

D( ) =

# 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:

; _____ : _____ -> _____

name Domain Range

; _____

*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?

= 

Use the function here What should the function produce?

## III. Definition

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

=

# 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:

; _____ : _____ -> _____

name Domain Range

; _____

*What does the function do?*

## II. Give Examples

Write an example of your function for <u>some sample inputs</u>

_____ = _____

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?

_____ = _____

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:

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*What does the function do?*

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Write an example of your function for some sample inputs

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

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# Design Recipe

## I. Contract+Purpose Statement

Every contract has three parts:

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Write an example of your function for <u>some sample inputs</u>

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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

| Name | Domain | Range | *example* |
|---|---|---|---|
| ; | : | → | |
| ; | : | → | |
| ; | : | → | |
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# Contracts

| Name | Domain | Range | *example* |
|---|---|---|---|
| ; | : | → | |
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