Nombre: _____



Libro de trabajo del estudiante

Clase: _____



Libro de trabajo v2.7

Traído para ti por el equipo de Bootstrap:

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Bootstrap Units

01	Videogames and Coordinate Planes	06	Comparing Functions
02	Contracts, Strings, and Images	07	Conditional Branching
03	Intro to Definitions	08	Collision Detection
04	Design Recipe	09	Prepping for Launch
05	Game Animation	10	Additional Material

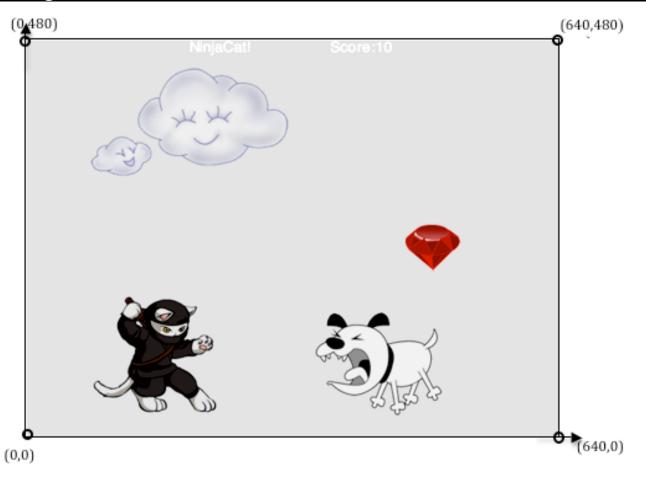


Lesson 1

Reverse-Engineering: How does NinjaCat work?

Thing in the game	What changes about it?	More specifically
cloud	position	x-coordinate

Finding Coordinates



The coordinates for the PLAYER (NinjaCat) are:	(,)	
	x-coordinate	y-coordinate	
The coordinates for the DANGER (Dog) are:		,)	
The coordinates for the TARGET (Ruby) are:	(,)	

Our Videogame

Created by (write your names):	
Background	
Our game takes place in:(space? the desert? a mall?)	
The Player	
The player is a	
The player moves only up and down.	
The Target Your player GAINS points when they hit the target.	
The Target is a	
The Target moves only to the left and right.	
The Danger Your player LOSES points when they hit the danger.	
The Danger is a	
The Danger moves only to the left and right	

Circle of Evaluation Practice Time: 5 minutes Don't forget to use the computer's symbols for things like multiply and divide!

Math	Circle of Evaluation	Racket Code
5 x 10		
8 + (5 x 10)		
(8 + 2) - (5 x 10)		
<u>5 x 10</u> 8 - 2		



	Circles C	ompetition	Time: 5 minutes
	Math	Round 1 -Circle of Evaluation	Round 2 - Racket Code
Challenge A	(3 * 7) - (1 + 2)		
Challenge B	3 - (1 + 2)		
Challenge C	3 - (1 + (5 * 6))		
Challenge D	(1 + (5 * 6)) - 3		



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 (____) ____)



Word Problem: rocket-height

Directions: A rocket blasts off, traveling at 7 meters per second. Write a function called 'rocketheight' 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.

Contract	and Purpose S	tatement		
Every contract ho	as three parts			
;	:		\rightarrow	
function na	me	domain	ra	nge
;				
		what does the t	unction do?	
Examples				
Write some exam	ples, then circle and	abel what changes		
(EXAMPLE())
	function name	input(s)	what the function produces	
(EXAMPLE())
	function name	input(s)	what the function produces	
Definition				
Write the definition	on, given variable nan	nes to all your input value	S	
(define()		
	function name	variables		
)

what the function does with those variables

Word Problem: lawn-area

Directions: 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!)

very contract h	nas three parts			
	:		\rightarrow	
function no	ame	domain	range	
		what does the funct	ion do?	
xamples	;			
rite some exar	mples, then circle and	abel what changes		
EXAMPLE())
	function name	input(s)	what the function produces	
EXAMPLE())
	function name	input(s)	what the function produces	
Definition				
	ion, aiven variable nan	nes to all your input values		
rite the definiti	on, given valiable han			
rite the definiti define(on, given valiable han)		

what the function does with those variables

13

Word Problem: red-square

Directions: 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.

Contract	and Purpose S	tatement		
Every contract	has three parts			
;	:		\rightarrow	
function	name	domain		range
;				
		what does the	e function do?	
Example	S			
Write some exc	amples, then circle and	label what changes		
(EXAMPLE())
_	function name	input(s)	what the function produ	ces
(EXAMPLE())
-	function name	input(s)	what the function produ	ces
Definition	ı			
Write the defini	ition, given variable nar	mes to all your input valu	es	
(define()		
	function name	variables		
)

what the function does with those variables

target



Game Animation

Word Problem: update-danger

Directions: 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.

very contract h	nas three parts				
very confident	ias iriiee paris				
	:			\rightarrow	
function no	ame	domain			range
		what does the	function do?		
Examples	;				
/rite some exar	mples, then circle and	label what changes			
EXAMPLE()	ı)
_	function name	input(s)		what the function produces	
EXAMPLE())
_	function name	input(s)		what the function produces	
Definition					
rite the definiti	ion, given variable naı	mes to all your input value	≥s		
define()			
	function name	variables			

what the function does with those variables

Word Problem: update-target

Directions: 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.

Contract	and Purpose S	tatement		
Every contract h	nas three parts			
;	:		→	
function no	ame	domain	range	
;				
		what does the fu	nction do?	
Examples	;			
Write some exar	mples, then circle and	label what changes		
(EXAMPLE())
	function name	input(s)	what the function produces	
(EXAMPLE())
	function name	input(s)	what the function produces	
Definition				
Write the definiti	ion, given variable nan	nes to all your input values.		
(define()		
	function name	variables		
)

what the function does with those variables

17



"safe-left?"

Comparing Functions

Design Recipe

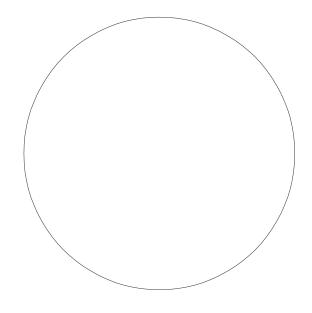
Sam is in a 640 x 480 yard. How far he can go to the left and right before he's out of sight?

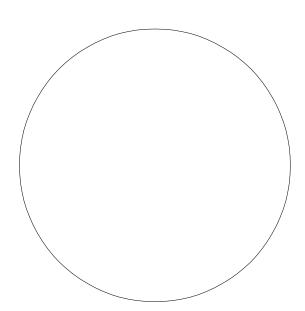
1. A piece of Sam is still visible on the left as long as...

(> 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:





Word Problem: safe-left?

Directions: 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

Contract	and Purpose S	tatement				
Every contract h	nas three parts					
;	:			\rightarrow		
function no	ame	domain			range	
;						
		what does th	ne function do?			
Examples	;					
Write some exar	mples, then circle and	label what changes				
(EXAMPLE())
_	function name	input(s)		what the function produces		
(EXAMPLE())
_	function name	input(s)		what the function produces		
Definition						
Write the definiti	ion, given variable nar	nes to all your input val	ues			
(define()				
	function name	variables				
)

what the function does with those variables

Word Problem: safe-right?

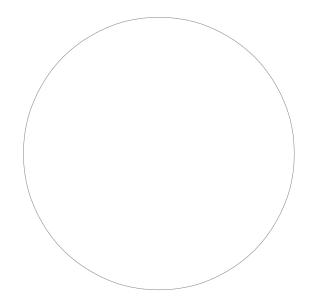
Directions: Use the Design Recipe to write a function 'safe-right?', which takes in an x-coordinate and checks to see if it is less than 690.

very contract n	as three parts			
;	:		\rightarrow	
function no	ame	domain	range	
		what does the funct	iion do?	
Examples				
Vrite some exan	nples, then circle and	abel what changes		
EXAMPLE())
	function name	input(s)	what the function produces	
EXAMPLE())
	function name	input(s)	what the function produces	
Definition				
Write the definiti	on, given variable nan	nes to all your input values		
)		
(define(,		

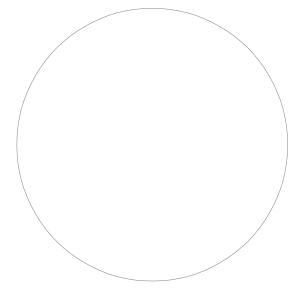
what the function does with those variables

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

1. Two is less than five, <u>and</u> zero is equal to six.



2. Two is less than four <u>or</u> four is equal to six.



Word Problem: onscreen?

Directions: 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.

Contract	and Purpose S	Statement				
Every contract h	as three parts					
;	:			\rightarrow		
function no	ame	do	main		range	
;						
		what a	loes the function do?			
Examples						
Write some exan	nples, then circle and	l label what change	es			
(EXAMPLE()			
	function name	input(s)				
)
	W	hat the function produces	S			
(EXAMPLE()			
	function name	input(s)				
)
		what the function produc	ces			
Definition						
Write the definition	on, given variable na	mes to all your input	t values			
(define()			
	function name	variables				
)

what the function does with those variables

7 Conditional Branching



Word Problem: cost

Directions: 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.

	and Purpose	Statement			
very contract h	nas three parts				
	:			→ 	
function no	ame	doma	in		range
		what does	the function do?		
Examples					
Vrite some exan	mples, then circle and	d label what changes			
(EXAMPLE(cost	"pepperoni"))
_	function name	input(s)		what the function produces	
(EXAMPLE())
	function name	input(s)		what the function produces	
(EXAMPLE())
	function name	input(s)		what the function produces	
(EXAMPLE())
	function name	input(s)		what the function produces	
Definition					
	ion, given variable no	ames to all your input vo	alues		
(define()		
	function name	variables			
(00	ond				
[1
_					
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_					
[1
-					
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-					
r					1)

Word Problem: update-player

Directions: 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.

ery contract	t has three parts				
	:			\rightarrow	
function	n name	dome	ain	ro	ange
		what doe	es the function do?		
xample	es ·				
	amples, then circle and l	abel what changes.			
EXAMPLE(update-player	320 "up"))
-	function name	input(s)		what the function produces	
EXAMPLE(update-player	100 "up"))
-	function name	input(s)		what the function produces	
EXAMPLE())
•	function name	input(s)		what the function produces	
EXAMPLE())
-	function name	input(s)		what the function produces	
Definitio	n				
	nition, given variable nam	nes to all your input v	alues		
define()		
	function name	variables	-		
(
·					
	[]
	[]
	г				

O8 Collision Detection

collision



Word Problem: line-length

Directions: 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.

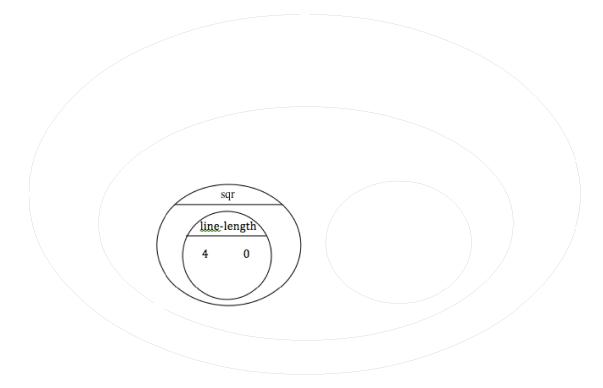
Contract and Purpose St	atement						
Every contract has three parts							
;						\rightarrow	
function name	domain					rang	e
;							
	what does th	ne func	ction d	οŞ			
Examples							
Write some examples, then circle and l	abel what changes						
(EXAMPLE(line-length	10 5)	(–	10	5))
function name	input(s)					what the function produces	
(EXAMPLE(line-length	2 8)	(–	8	2))
function name	input(s)					what the function produces	
Definition							
Write the definition, given variable nam	es to all your input val	ues					
(define()	1					
function name	variables						
(cond							
I							
_							1))

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 to code, then label the numbers with (x1,y1) & (y1,y2):

Word Problem: distance

Directions: 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!)

Contract	and Purpose S	Statement				
Every contract h	nas three parts					
;	:			\rightarrow		
function no	ame	do	omain		range	
;						
		what c	does the function do?			
Examples	•					
_	mples, then circle and	lahel what change	25			
	ripies, men enere and	laber what change				
(EXAMPLE()			
	function name	input(s)				
)
		what the	e function produces			
(EXAMPLE()			
	function name	input(s)				
)
		wha	at the function produces			
	_	_		_	_	_
Definition						
Write the definiti	ion, given variable na	mes to all your inpu	t values			
(define()			
	function name	variables	—			
)
		what the fund	ction does with those variables			,

Word Problem: collide?

Directions: 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?

Contract	and Purpose S	Statement			
Every contract	has three parts				
;	:			\rightarrow	
function r	name	C	domain		range
;					
-		what	does the function do?		
Example	S				
Write some exa	imples, then circle and	l label what chang	ges		
(EXAMPLE())
_	function name	input(s)		what the function produce.	S
(EXAMPLE())
_	function name	input(s)		what the function produce.	S
Definition	1				
Write the definit	tion, given variable na	mes to all your inp	ut values		
(define()		
	function name	variables			
)
		what the fu	nction does with those v	variables	



Presentation Preparation



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! Definitely! A little. 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! Definitely! A little. 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! Definitely! A little. 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! Definitely! A little. 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!

Word Problem: red-shape

Directions: 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.

Contract	and Purpose S	Statement					
every contract l	has three parts						
;	:				→		
function n	name	dom	nain			range	
:							
		what do	es the fu	nction do?			
Examples	S						
Vrite some exa	mples, then circle and	label what changes	5				
(EXAMPLE(red-shape	"circle")	(circle 50	"solid"	"red"))
_	function name	input(s)		v	vhat the function p	roduces	
(EXAMPLE())
_	function name	input(s)		V	what the function p	roduces	
EXAMPLE ())
	function name	input(s)		V	vhat the function p	roduces	
EXAMPLE ())
	function name	input(s)		V	vhat the function p	roduces	
Definition							
	tion, given variable nai	mes to all your input	values.	···			
(define()				
	function name	variables	_				
(c	ond						
_							
[(circle 50	"solid"	"red")]
•							
]]
]]
[]
r							1 \

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
<pre>(define (area length width) (* length width))</pre>	area(length, width) = length * width
(define (circle-area radius) (* pi (sqr radius)))	
(define (distance x1 y1 x2 y2) (sqrt (+ (sqr (- x1 x2))	

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 S Every contract has three p		
; <u> </u>		>
name	Domain	Range
,	What does the function do?	
I. Give Examples Write an example of your	function for <u>some sample inputs</u>	
D(1) =		
Use the function here	What should the function produce?	
D(2)=		
Jse the function here	What should the function produce?	
D() =		
Jse the function here	What should the function produce?	
=		
Jse the function here	What should the function produce?	
III. Definition Write the formula, giving v	variable names to all your input values.	
D() =		

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

Contract+Purpose S		
very contract has three p	parts:	
•		
•		
name	Domain	Range
	What does the function do?	
Give Examples		
-	function for <u>some sample inputs</u>	
, ,	· · · · · · · · · · · · · · · · · · ·	
=		
se the function here	What should the function produce?	
=		
se the function here	What should the function produce?	
- 40 - 4 4		
e the function here	What should the function produce?	
=		
e the function here	What should the function produce?	
e me fortenon nero	What should the folleholf produce;	
. Definition		
rite the Formula, giving v	variable names to all your input values.	
=		

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?

:		·>
name	Domain	Range
	What does the function do?	
Give Examples	function for <u>some sample inputs</u>	
=		
e the function here	What should the function produce?	
=		
e the function here	What should the function produce?	
=		
e the function here	What should the function produce?	
=		
e the function here	What should the function produce?	
. Definition		

I. Contract+Pu	rpose Stateme	nt		
Every contract has th				
· ;	<u> </u>		>	
name		Domain	Range	
•				
		What does the function do?		
II. Give Examp	les			
		or <u>some sample inputs</u>		
Use the function here	=	What should the function produce?		_
ose 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				
	giving variable	names to all your input values.		
		, ,		
	=			

I. Contract+P	urpose Statem	ent		
Every contract has t				
•	•		->	
name		Domain	Range	
•			Ç	
,		What does the function do?		
		·····a·· accome remement de l		
II. Give Examp		fan anna anna la innuta		
write an example of	f 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				
	aivina variabl	e names to all your input values.		
wille the formula,	giving variable	e names to all your input values.		
	=			

Contracts

Name	Domain	Range	example
•		^	
••	••	^	
••	••	^	
•	:	^	
•	:	*	
•	:	*	
•	:	↑	
•	:	*	
•	:	*	
•	:	↑	
•	:	*	
•	:	^	
•	:	*	
•	:	^	
••	:	↑	
••	:	↑	
••		^	
••	:	*	

Contracts

Name	Domain	Range	example
•		^	
••	••	^	
••	••	^	
•	:	^	
•	:	*	
•	:	*	
•	:	↑	
•	:	*	
•	:	*	
•	:	↑	
•	:	*	
•	:	^	
•	:	*	
•	:	^	
••	:	↑	
••	:	↑	
••		^	
••	:	*	