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

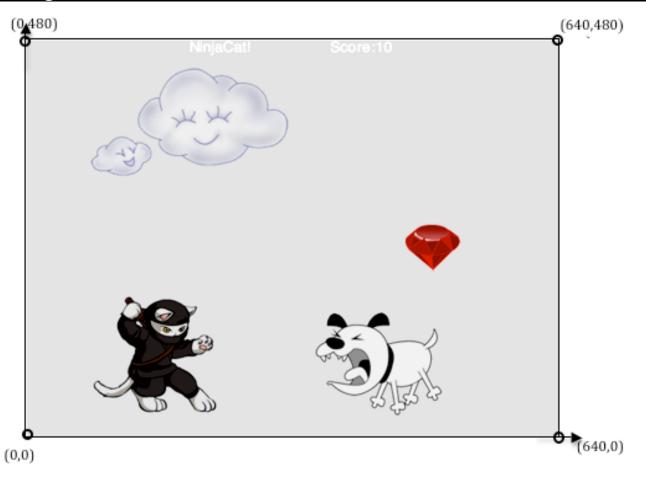


Lesson 1

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	ə:	(,)	
		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 Co	mpetition	Time: 5 minutes
	Math	Circle of Evaluation	Racket Code
Round 1	(3 * 7) - (1 + 2)		
Round 2	3 - (1 + 2)		
Round 3	3 - (1 + (5 * 6))		
Round 4	(1 + (5 * 6)) - 3		



Fast Functions			
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(EXAMPLE ())
(define ())

Fast Functions			
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target



Game Animation

		Word Problem: upo	late-danger	
Directions: U. and produces	se the Design Recipe the next x-coordinat	to write a function 'update-d e, which is 50 pixels to the left	langer', which takes in the danger i.	's x-coordinate
Contract a	nd Purpose Sta	tement		
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		that days the favorier	w	
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		Word Problem: up	odate-target	
Directions: Wr coordinate, wh	ite a function 'upda ich is 50 pixels to th	te-target', which takes in the e right.	target's x-coordinate and produce	the next x-
Contract an	d Purpose Stat	lement		
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"safe-left?"

Comparing Functions

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:





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ry contract has f	leve parts			
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function non	-	densir		Ampr
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te some example	, then circle and label wi	ur changes		
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	ples, then circle and lab			
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and / or

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 Pro	blem: onscreen?	
Directions: Us see if Sam is si	the Design Recipu afe on the left AND	to write a function safe on the right.	onscreen?", which takes in the	se x-coordinate and checks to
Contract as	ıd Purpose Sta	tement		
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facility and	-	-	main	
·——		- the	does the function de!	
Examples	s, then circle and label w	her changes		
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		what she function produces		`
(EXAMPLE))	
	function name	Appendix		
		what the function produces		
Definition	gives variable names to	all your input values		
(define()	
_	function name	nariables	_	
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7 Conditional Branching



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faculties non		densi			
		where does	with function do."		
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	s, then circle and label				
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Directions: Write a function called	l undote nlover whi	ch takes in the	planer's x-coordinate and the ma	me of the key
pressed, and returns the new y-cos	ordinate.		,,	
Contract and Purpose Sta				
very contract has three parts			_	
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,			_	
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Examples				
rice some examples, then circle and label w	her changes			
EXAMPLE(update-player	320 "up"))
familionnam	Agentical		what the function produces	
EXAMPLE(update-player	100 "up"))
function name	Aspendict		what the function produces	
EXAMPLE (imatri)	what the forestion resolvers)
EXAMPLE (Appendix)	what the function produces	
EXAMPLE (- Innerio	,	what the function produces	,
Definition				
rice the deflection, given variable names to	all your input values			
define()		
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O8 Collision Detection

collision



		Word Pro	blem	line	e-leng	th	
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		otar	does the fun	riture dell'			
Examples	les, then circle and label s	eher changes					
(EXAMPLE(line-length	10 5)	(-	10 5))
-	function name	Aspectal				what the function produces	
(EXAMPLE(line-length	2 8)	(-	8 2))
-	functionness	Agrantis				what the function produces	
Definition							
Write the defluition	n, given variable names to	all your input values					
(define()				
	facilies name	nanialiles					
(0	ond						
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t							1
1							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 into Racket code:

		Word I	Problem: dist	ance		
Directions: W	rite a function dista	nce, which takes	FOUR inputs:			
• py: The • cx: the	x-coordinate of the y-coordinate of the x-coordinate of anot y-coordinate of anot	player ther game charac				
It should retur previous page		nen the two, using	the Distance forn	nsla. (HINT: look at	what you did on	the
	nd Purpose Sta	tement				
Every contract has	sleve parx					
:						
favorine no	~		demain		Ampr	
;						
		-	that does the function do."			
Examples		ther change				
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	Service name	Apparini	′			
			e de Sausian eroduce			
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(EXAMPLE)						
	function name	Agentici				
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Definition	given variable names to	all your input values	-			
(define()			
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		Word Pr	oblem: col	llide?	
Directions: W	rite a function collic	le?, which takes FC	OUR inputs:		
• py: The • cx: the	x-coordinate of the y-coordinate of the x-coordinate of ano y-coordinate of ano	player her game characte			
Are the coord	inates of the player v	vithin 50 pixels of t	he coordinates	of the other character?	
Contract a	nd Purpose Sta	tement			
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Examples	es, then circle and label w	har changes			
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Definition					
	, given variable names to	all your input values			
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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 Prob	olem: red-sha	pe	
	Frite a function called else clause that produ			a shape and draws that shape (solid and
	nd Purpose Stat	ement			
ery contract has	three parts			-	
function o	_	don		- may	
		whereh	en de fancies de!		
Examples					
rite some exampl	les, then circle and label wi	or changes			
EXAMPLE(red-shape	"circle") (circle	50 "solid" "red"))
	familiariam	Appendix		what the function produces	
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	function name	Appendix		what the function produces	
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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		
Every communities p	, can 5.	
; <u>D</u> :		>
name	Domain	Range
,	What does the function do?	
II. Give Examples		
Write an example of your t	function for <u>some sample inputs</u>	
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 v	ariable 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>	
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e the function here	What should the function produce?	
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e me fortenon nero	What should the folleholf produce;	
. Definition		
rite the Formula, giving v	variable names to all your input values.	
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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?

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name	Domain	Range
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Contracts

Name	Domain	Range	example
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Contracts

Name	Domain	Range	example
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