Contracts

Name	Domain	Range	Example
	"	<-	
	"	~ -	
	::	^-	
	"	^-	
	"	^-	
	"	<-	
	#	<-	
	::	^-	
	::	^-	
	::	^-	
	"	^-	
	"	^-	
	::	<-	
	::	->	
	::	-	
	::	->	
	::	^	

Contracts

Name	Domain	Range	Example
	"	<-	
	"	~ -	
	::	^-	
	"	^-	
	"	^-	
	"	<-	
	#	<-	
	::	^-	
	::	^-	
	::	^-	
	"	^-	
	"	^-	
	::	<-	
	::	->	
	::	-	
	::	->	
	::	^	

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	e: (,)	
		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	Pyret Code
5 x 10		
8 + (5 x 10)		
(8 + 2) - (5 x 10)		
<u>5 x 10</u> 8 - 2		

(draw Circles of Evaluation here if you need extra scratch paper)

	Circles Cor	npetition	Time: 5 minutes
	Math	Circle of Evaluation	Pyret 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 Function	ons					
		::		->	>	
name		do	main		range	
examples:						
	()	is			
	()	is			
end						
fun	():				end
		_::		-	.>	
name		d	omain		range	
examples:						
	() is			
	() is			
end						
fun	():				end
		_::			.>	
name		d	omain		range	
examples:						
	() is			
	() is			
end						
fun	() :				end

Fast Function	S				
	::		->		
name		domain		range	
examples:					
(() is			
	(
end	`				
	\ •				end
(_	/ •				end
			->		
name	·-	domain		range	
examples:				Jango	
•	() is			
	(/) is			
	(/ 15			
end	,				_
fun():				end
	::	domain	>		
name examples:		domain		range	
examples.	1	\ = -			
	() is			·
	() is			
end					
fun ():				end

Word Problem: rocket-height

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.

What does the function do? Give Examples he computer, write an example of your function in action, using EXA/ EXAMPLE ()
What does the function do? Give Examples he computer, write an example of your function in action, using EXA/	Range MPLE.
What does the function do? Give Examples The computer, write an example of your function in action, using EXAMPLE the user types	Range MPLE.
What does the function do? Give Examples The computer, write an example of your function in action, using EXAMPLE the user types)
What does the function do? Give Examples The computer, write an example of your function in action, using EXAMPLE the user types)
Give Examples the computer, write an example of your function in action, using EXAMPLE ()
the computer, write an example of your function in action, using EXALEXAMPLE ()
CXAMPLE (the user types)
the user types	
JNUSED – See pages/roc meight.scrbl	cket-
JNUSED - See pages/round become should become seight.scrbl	<u>cket-</u>)
which should become	
leignt.scrbl	
IXAMDI D. /	,
EXAMPLE ()
оне всен сурсани	
which should become)
Definition Write the definition, giving variable names to all your input values.	
write the definition, giving variable names to all your input values.	
lefine (1
function name variable names	

Word Problem: red-square

Use the Design Recipe to write a function <u>red-square</u>, which takes in a number (the size of the square) and outputs a solid red rectangle whose length and width are the same size.

I. Contrac	t+Purpose Statement			
Every contract I	nas three parts:			
•	·		->	
Name	·	 Domain	Range	
Hame		Domain	Nange	
•				
•	Wha	t does the function do?		
II. Give Ex	amples			
		our function in action, using EXAM	NPLE	
(EXAMPLE ()	
	the user says			
			_	
UNU	SED – Se	ee pages/red		
)	
squa	re.scrbl	Racket replies		
(EXAMPLE (41	5)	
	the user says	5		
_)	
		Racket turns that into	 ,	
III. Definition	on			
Write the	definition, giving variable	e names to all your input values.		
(d = C ' = = (`	
(define (_)	
	function name	variable names		
)
	and the computer of	does this		

Word Problem: yard-area

Use the Design Recipe to write a function <u>yard-area</u>, which takes in the width and length of a yard, and returns the area of the yard.

(Don't forget: area = length * width !)

I. Contract+Purpose State	ment	
Every contract has three parts:		
•		->
name •	Domain	Range
;	What does the function do?	
	What does the function do?	
II. Give Examples		(4448) 5
On the computer, write an examp	ple of your function in action, using EX	AMPLE.
(EXAMPLE ()
Use	the function here	·
		1
	find another way to get the same result he	/ ere
HNUSED -	See pages/la	wn-
(FYAMPLE (occ pages/la	/ AA I I –
area scrhuse	the function here)
arca.scrbi		
	God coathan was to get the come yould be)
	find another way to get the same result he	ere
III. Definition		
vvrite the definition, giving	variable names to all your input values	
(define ()
function name	variable names	/
)
and the co	omputer does this	/

Word Problem: update-danger

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

•	•			
name	•	Domain	> Range	
•				
,		s the function do?		
I. Give Examples On the computer, write	an example of your	function in action, using EXA	AMPLE.	
(EXAMPLE (nere)	
(Use the function h	nere		
UNU <u>SE</u> E danger.s) — See find anoth	pages/uponer way to get the same result her	date-)	
(EXAMPLE ()	
(Use the function h		,	
			1	
	find anoth	ner way to get the same result her	e)	
			e)	
Write the definition	on, giving variable nai	mes to all your input values.	e)	
Write the definition (on, giving variable nai		e)	

Word Problem: update-target

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

I. Contract+P	Purpose Statement			
Every contract has				
•	•		->	
name		Domain	Range	
•				
,	What	does the function do?		
II Civo Even				
II. Give Exam On the computer, v		our function in action, using EXA	MPLE.	
(EVALADI E (`	
(EXAMPLE (Use the functi	ion here)	
	find a	another way to get the same result here)	
		mother way to get the sume result here	-	
(EXAMPLE (,	
(LXAMPLL (Use the functi		/	
	ED Ca		4-4-	
UNU3	ED - 26	e pages/up	date-	
toract	find a	another way to get the same result here)	
target	<u>.50101</u>	, ,		
III. Definition Write the de	efinition, giving variable	e names to all your input values.		
		, ,		
(define ()	
fı	unction name	variable names		
	and the computer do	oes this		_)
	and the computer ut	000 0113		

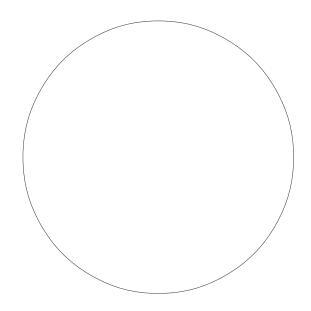
Sam is in a 640 x 480 yard. How far he can go to the left and right before he's out of sight?

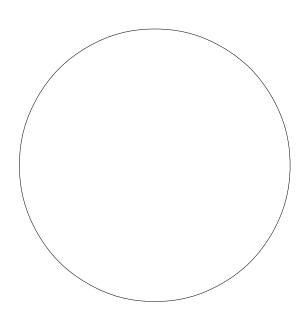
1. A piece of Sam is still visible on the left as long as...

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?

Use the Design Recipe to write a function <code>safe-left?</code>, which takes in an x-coordinate and checks to see if it is greater than -50.

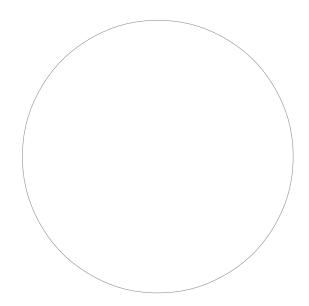
I. Contract+Purpos				
Every contract has three p	рапs:			
;:			>	
name		Domain	Rang	ge
•				
,		the function do?		
II. Give Examples				
On the computer, write ar	example of your fur	nction in action, using I	EXAMPLE.	
(EXAMPLE ()	
	Use the function he	ere	·············/	
UNU <u>SE</u> [) - See	nages/s	safe-let	ft scrb
ONOOLL	find anothe	er way to get the same resi	ılt here	
(EXAMPLE ()	
(LXAMI LL (Use the function he	ere	<i>)</i>	
				`
	find anothe	er way to get the same resu	 ult here	_)
III Definition		, ,		
III. Definition Write the definition	ı, giving variable nan	nes to all your input va	lues.	
	, 5	, ,		
(define ()	
function	name	variable names		
)
		nd the computer does this		

Word Problem: safe-right?

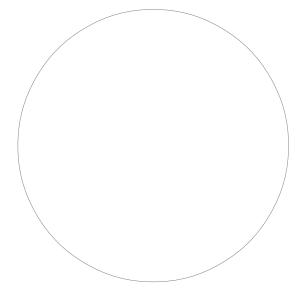
Use the Design Recipe to write a function <u>safe-right?</u>, which takes in an x-coordinate and checks to see if it is less than 690.

I. Contract+Purpose S			
Every contract has three par	ts:		
		->	
name •	Domain	Range	_
;			_
	What does the function do?		
II. Give Examples	xample of your function in action, using EXAM	ADI E	
on the computer, write an e	xample of your function in action, using Exam	IPLL.	
(EXAMPLE ()	
	Use the function here		
HNUSED .	See pages/safe	Δ_	
ONOOLD -	- Occ pages/said)	
right scrh	find another way to get the same result here	,	
<u> </u>			
(EXAMPLE (Use the function here)	
	Use the function here		
)	
	find another way to get the same result here		
III. Definition			
	ving variable names to all your input values.		
(d = C :=== (`	
(define ()	
function nam	e variable names		
			`
)

Write the Circles of Evaluation for these statements, and then convert them to Pyret 1. Two is less than five, <u>and</u> zero is equal to six.



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



Word Problem: onscreen?

Use the Design Recipe to write a function <u>onscreen?</u>, which takes in an x-coordinate and checks to see if Sam is safe on the left <u>and</u> safe on the right.

•			->	
name	Doma		Range	
	What does the function	do?		
Give Examples the computer, write a	n example of your function in	action, using EXAM	PLE.	
EXAMPLE (Use the function here)	
(Use the function here		,	
IIMIIQEI) 500			
UNU <u>SE</u> [) – See	the same result have)	
UNU <u>SEI</u> pages/o	See find another way to get	the same result here)	
UNU <u>SEI</u> pages/o	J - See find another way to get SCREEN.SC	the same result here)	
	find another way to get nscreen.sc			
	Use the function here			
EXAMPLE (
EXAMPLE (Use the function here find another way to get	the same result here		
EXAMPLE (Definition Write the definition	Use the function here	the same result here our input values.		

...and the computer does this

Word Problem: cost

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.

I. Contract+Purpose Stateme	nt	
		->
name •	Domain	Range
II. Give Examples		
On the computer, write an example o	of your function for each top	pping, using EXAMPLE.
(EXAMPLE(cost "p	pepperoni"))
Use the function h	nere	What should the function produce?
(EXAMPLE()	
)	
Use the function h	iere	What should the function produce?
(EXAMPLE()	
Use the function h) nere	What should the function produce?
	1	
(EXAMPLE(/	
Use the function h	nere	What should the function produce?
III. Definition		
		`
(define ()
function name	variable names	
		
LINUICED	C	
UNUSED -	- See pag	es/cost.scrbl

Word Problem: update-player

Write a function called <u>update-player</u>, which takes in the player's y-coordinate and the name of the key pressed, and returns the new y-coordinate.

ain Range
e two more
What should the function produce?
mes
ages/update-
; , , , , , , , , , , , , , , , , , , ,

Write a function called <u>line-length</u>, which takes in two numbers and returns the difference between them. It should always subtract the smaller number from the bigger one.

	ract+Purpose Stater ct has three parts:	ment					
,					>		
name				Domain		Range	
II. Give I	Examples						
(EXAMPLE	(line-length Use the functi	10 on here	5)	(- 10 What should the fu	5) nction produce?)
(EXAMPLE	(line-length Use the functi	2 on here	8)	(- 8 What should the fu	2) nction produce?)
III. Defini							
Write	the definition, giving	variable na	ames to	all your inpu	ıt values.		
(define	function name)		
	function name			variable nar	mes		
UNL	JSED -	See	e pa	ages	s/line-		
leng	th.scrb	H					-
_							
)							

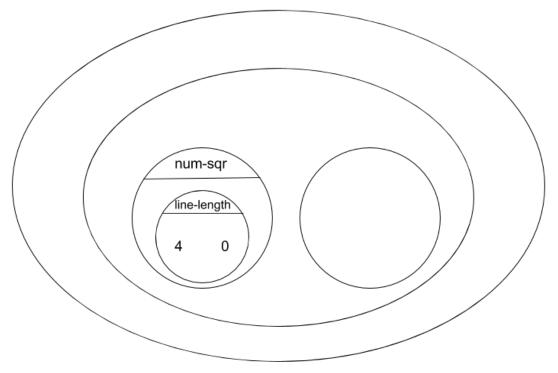
...and the computer does this

The Distance Formula (an example)

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

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

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



Convert the Circle of Evaluation into Pyret code:

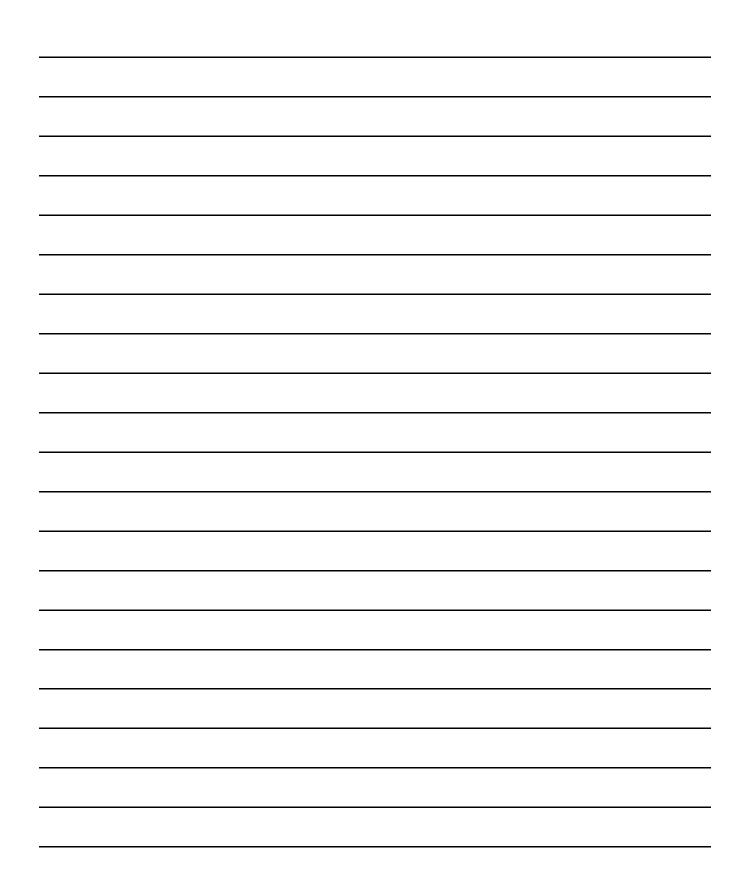
Write a function <u>distance</u>, which takes FOUR inputs:

\Box px: The x-coordinate of the p	•		
□ py: The y-coordinate of the p	•		
□ cx: The x-coordinate of anoth			
□ cy: The y-coordinate of anoth			
It should return the distance between on page 27!)	n the two, using the Distance formula.	(HINT: look at what you did	
I. Contract+Purpose Stateme	ent		ı
			•
: :		->	
name	Domain	Range	
;			
	What does the function do?		
II. Give Examples			I
<u> </u>			
(EXAMPLE (e function here)	
Use the	e function here		
UNUSED — S	See pages/die	stance.scr	b -
(EVAMPLE (1	
(EXAMPLE (e function here)	
)
	find another way to get the same result here	e	
III. Definition			•
			ı
(define ()	
function name	variable names	/	
)	
		,	

Write a function collide?,which takes FOUR inputs:
px: The x-coordinate of the player

I. Contract+Purpose	Statement		
name • _	Domain	> Range	_
· ,			
	What does the function do?		
II. Give Examples			
(EXAMPLE (Use the function here)	
UNUSED	- See page	es/collide.sc	rbl
	find another way to get the	same result here	
(EXAMPLE ()	
	Use the function here		
)	
	find another way to get the	same result here	
III. Definition			
(define (le names	

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! A little. Definitely! Did they talk about their characters? No way! Did they explain the code well? No way! A little. Definitely! Did they speak slowly enough? No way! A little. Definitely! No way! Definitely! Did they speak loudly enough? A little. Were they standing confidently? No way! Definitely! A little. Did they make eye contact? No way! Definitely! A little.

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 otherwise clause that produces a sensible output.

Contract an	d Pu	rpose Sta	te	men	nt
Every contract has three	e parts				
	::				->
function name				do	omain range
#					
				what d	loes the function do?
Examples					
Write some examples, t	hen circl	e and label what ch	nange	es	
examples:					
red-shape	("circle")	is	circle(50, "solid", "red")
function name		input(s)			what the function produces
	()	is	
function name		input(s)			what the function produces
	()	is	
function name		input(s)			what the function produces
)	is	
function name		input(s)			what the function produces
	()	is	
function name		input(s)			what the function produces
end					
Definition					
Write the definition, give	en variab	le names to all you	ır inp	ut value	es
fun	():	
function name		variables			
if				_	circle(50, "solid", "red")
else if					:
else if					:
else if					:
else:				_	
end					

end

Translating into Algebra

Value Definitions

Pyret Code	Algebra
x = 10	x = 10
y = x * 2	y = x*2
z = x / y	
w = num-sqrt(num-sqr(x) + 1)	
days = (age * 12) * 30	
y = (v * x) + x0	
y = ((0.5 * a) * num-sqr(x)) + y0	

Function Definitions

Pyret Code	Algebra
<pre>fun area(length, width): length * width end</pre>	area(length, width) = length * width
<pre>pi = 3.1415926 fun circle-area(radius): pi * radius end</pre>	
<pre>fun distance(x1, y1, x2, y2): num-sqrt(num-sqr(x1 - x2) + num-sqr(y1 - y2)) end</pre>	

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.

l.			urpose S		ent		
Every	contra	ct has t	hree par	ts:			
	D		•			->	
ш	name		_ •		Domain	Range	
#					What does the function do?		
II.		Examp					
Write a	an exa	nple of	your fur	ction f	or <u>some sample inputs</u>		
	D()	1)	is				
Use the	function	here			What should the function produce?		
	D(:	2)	is				
Use the	function	here			What should the function produce?		
	D(`	is				
Use the	function	here	15		What should the function produce?		
			is				
Use the	function	here			What should the function produce?		
III.	Defin	ition					
			iving var	iable n	names to all your input values.		
fun end	`)	:		

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 Sta	atement	
Every contract has	s three parts	:	
	_		
	·_		>
name		Domain	Range
#		What does the function do?	
II. Give Exan			
Write an example	of your funct	tion for <u>some sample inputs</u>	
	<u>is</u>		
Use the function here		What should the function produce?	
	<u>is</u>		
Use the function here		What should the function produce?	
	_		
	is		
Use the function here		What should the function produce?	
	_		
	is		
Use the function here		What should the function produce?	
III. Definition			
Write the function	, giving varia	ble names to all your input values.	
fun	() :	
_	`	, -	
end			

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. Cont	ract+Purpose State	ment	
Every contra	ct has three parts:		
	•	_	->
name		Domain	Range
#			
<i>''</i>		What does the function do?	
II. Give	Examples		
		n for <u>some sample inputs</u>	
	is		
Use the function		What should the function produce?	
	is		
Use the function	n here	What should the function produce?	
	is		
Use the function	n here	What should the function produce?	
	is		
Use the function	n here	What should the function produce?	
III. Defin	ition		
		names to all your input values.	
fun end	():	

I. Contract+P				
Every contract has	tnree parts:			
	:		->	
name #		Domain	Range	
		What does the function do?		
II. Give Exam	oles			
		ion for <u>some sample inputs</u>		
	is			
Use the function here	15	What should the function produce?		
	is			
Use the function here		What should the function produce?		
	is			
Use the function here		What should the function produce?		
		·		
	is			
Use the function here		What should the function produce?		
III. Definition				
	giving variat	ole names to all your input values.		
, ,		, ,		
fun	():		
end	`	,		