Contracts

ige example																	
Range	1	↑	1	1	1	↑	↑	1	1	1	1						
Domain	•	:	•	:	•		•	:	•		•	:	:			•	
Name	;	••	••	•	••	••	••	•	••	••	••	•	•	••	••	••	••

Contracts

example																	
Range	↑	1	1	1	↑	1	1	↑	1								
Domain	:	•	•	:	:		•	:	•	•	•	•	•	•	•	•	•
Name	•	•	•	•	;	••	••	•	•	•	•	•	•	•	••	•	;

	Circles Competition		Time: 5 minutes
	Circles Competition Math	Circle of Evaluation	Time: 5 minutes Scheme Code
Round 1	(1 + 2) - (3 * 7)		
Round 2	3 - (1 + 2)		
Round 3	3 - (1 + (5 * 6))		
Round 4	(1 + (5 * 6)) - 3		

Fill out the contract for each fur	nction, then try to write two ex	xamples and the definition by yourse	elf.
; <u>double</u>	:Number	> _Number	_
name	domain	range	
(EXAMPLE (<u>double</u>	(* 2 5)	
(EXAMPLE (<u>double</u>	7) (* 2 7)	
(define <u>(double</u>	<u>n) (* 2 r</u>	າ))	
;	:	>	
name	domain	range	
(EXAMPLE ())
(EXAMPLE ())
(define ())
• •	:	>	
(EXAMPLE ())
(EXAMPLE ())
(define ())
;	:	>	
(EXAMPLE ())
(EXAMPLE ())
(define ())

DESIGN RECIPE: SAMPLE

				_		-	len	
		ТΔ	тп	\mathbf{a}				• 1
,	140		ч		1716	~, ~,	ı	4 2

Make a circle (spot) of size 100, with the provided color

Contract+Purpose Statement

Every contract has three parts:

; $\underbrace{\mathsf{spot100}}_{\mathsf{name}}$: $\underbrace{\mathsf{String}}_{\mathsf{Domain}}$ -> $\underbrace{\mathsf{Image}}_{\mathsf{Range}}$

; Makes a size 100 circle in a color

What does the function do?

Give Examples

On the computer, write an example of your function in action, using EXAMPLE.

(EXAMPLE (spot100 the user types... (EXAMPLE (spot100 the user types... (EXAMPLE (spot100 the user types... (blue") (circle 100 "solid" (green)) (circle 100 "solid" (blue") (circle 100 "solid" (blue")) (circle 100 "solid" (blue")) (circle 100 "solid" (blue"))

Function

Circle the changes in the EXAMPLEs, and name the variables.

Write the code, copying everything that isn't circled, and using names where you find variables!

(define (spot100 color c

DESIGN RECIPE: DOUBLE-RADIUS

Contract+Purpose	e Statement			
Every contract has	s three parts:			
•	·	Domain	> Range	
;				_
	What do	oes the function do?		
Give Examples				
On the computer,	write an example of you	ır function in action, ı	using EXAMPLE.	
(EXAMPLE (the user types		n should become)
(EXAMPLE (the user types)	n should become)
Function Circle the	changes in the EXAMPLE	s, and name the varia	bles.	
	•		d using names where you find	t
(define ())

DESIGN RECIPE: DOUBLE-WIDTH

Contract+Purpos	e Statement			
Every contract ha	s three parts:			
;	:		>	
name		Domain	Range	
;	What d	oes the function do?		_
Give Examples On the computer,	write an example of you	ur function in action, usi	ng EXAMPLE.	
(EXAMPLE (_	the user types	which sh	ould become)
(EXAMPLE (_	the user types	which sh	ould become)
	changes in the EXAMPLE code, copying everything		es. sing names where you find	i
(define ())

DESIGN RECIPE: PAINT-JOB

Contract+Purpose Statement		
•		->
name s	Domain	Range
; 	What does the function do?	
Civo Evamples	mac does the rangelon do.	
Give Examples On the computer, write an exa	ample of your function in action, using EX	(AMPLE.
(EXAMPLE ()
(,
)
(EXAMPLE ()
)
Function		
		,
(define ()

DESIGN RECIPE: TURBO-CHARGE

Contract+Purpose Statement		
;::		>
name •	Domain	Range
,	What does the function do?	
Give Examples		
On the computer, write an exam	nple of your function in action, using	EXAMPLE.
/EVAMDLE /		,
(EXAMPLE ()
)
(EXAMPLE ()
		
Function		
(dofina (,
(define (
)

DESIGN RECIPE: PIMP

ontract+Purpose	Statement	
	:>	
name	Domain	Range
	What does the function do?	
ive Examples		
on the computer, v	vrite an example of your function in action, using EXAMPLE	-
in the compater, v	whee an example of your function in action, asing 270 and 22	- .
EXAMPLE ()
\		,
)	
	,	
EXAMPLE ()
)	
unction		
define ()
	Y	

DEFINE-STRUCT

Autos:

; an auto is a		
(define-struct auto	(
		_))
; a party is a		
(define-struct party	(_

DESIGN RECIPE: RSVP

	- ;	>	
name	Domain	Range	
	What does the function do?		
ive Examples			
the computer, wri	e an example of your function in action, using	EXAMPLE.	
EXAMPLE ()
(_,
			
)	
EXAMPLE (_)
)	
		,	
unction			
define (`
			,
<u></u>			
<u>(</u>			

DESIGN RECIPE: RELOCATE

·		>	
name	Domain	Range	
	What does the function do?		
Examples			
the computer, write an examp	ble of your function in action, using I	EXAMPLE.	
(AMPLE ()
)	
			`
(AMPLE ()
			
)	
ction			
efine ()
			
		1	

Dissecting a Demo: Ninja World	
What changes?	
·	
Ninja World:	
; a world is a	
(define-struct world ())	
My constructor function is:	
1) (How do you make a world?)	
What is its contract?	
My accessor function is:	
2) (How do you get the dogX out of the world?)	
What is its contract?	

DESIGN RECIPE: UPDATE-WORLD (NINJA WORLD)

name	:	Domain	Range	
;	Wha	t does the function do?		
Give Examples On the computer, v	write an example of y	our function in action, using	EXAMPLE.	
(EXAMPLE	()
(EXAMPLE	())
)
Function				
(define (_)
				١

Review: define-struct

Last week we talked about a function that created new structs. For the structs below, what function would you use for each of the following?

; an auto is a String Number	Number
(define-struct auto (model hp rims color value))	
Make an auto?	
Get the model out of an auto?	
Get the hp out of an auto?	
; a party is a String Number	
(define-struct team (location theme guests))	
Make a team?	_
Get the city out of the team?	
Get the sport out of the team?	
Get the rank out of the team?	
; a world is a Number	
(define-struct world (dogX))	
What function would you use to:	
Make a world?	
Get the dogX out of the world?	

GAME DESIGN

"Start Simple, Get Complex"

Draw a rough sketch of y	our game in actio	n	
What images will you nee	ed for your game?		
Background			
List everything that has o	changed and the	datatype you will use to re	enresent it
Changed (position? score? co		Datatype (number? stri	

; a world is a	 	
(define-struct world		
))	
My constructor function is		
; make-world :	 	→ World
My accessor functions are		
;		
<u>;</u>		
; 		
;		

(0, 480)	STA	RT	(640,480)
(0, 0)			(640, 0)
At the start of my	game, this is where everything is:		
Object (top	to bottom of stack)	Position (x, y)	
Background			
(define STA	ART(make-world		
		<u> </u>	

(0, 480)	NEXT	Γ	(640,480)
(0, 0)			(640, 0)
A split second late	er, this is where everything is:		
Object (top	to bottom of stack)	Position (x, y)	
	_		
Background			
(define NE)	XT (make-world		

	DRAW-WORLD
Contract	
;	_:>
Using put-image	
define ()
put-image	
(put-i	mage
	(put-image
	(put-image
	BACKGROUND

DESIGN RECIPE: UPDATE-WORLD

State the problem (What changes?):

· ·		->
name •	Domain	Range
, ,	What does the function do?	
3 : 5	what does the function do:	
Give Examples On the computer, write an exa	mple of your function in action, using	EXAMPLE.
(EXAMPLE ()
)
(EXAMPLE ()
)
		,
Function		
(define ()
(,
		

When the user presses	this part	Changes by

DESIGN RECIPE

State the Problem
For each keypress in the Ninja World game, show how (keypress START <key>) should change your world.

· ·		->
name	Domain	Ranges
Give Examples		
EXAMPLE (keypress START)
(make-world		
))
(EXAMPLE (keypress START)
(make-world		
))

(define (_)
(cond [()	
	-	 	
	_		_]
[()	
	-		
		 	—]))
	-	 	J <i>J)</i>

DESIGN RECIPE

State the Problem

For each keypress in your game, show how (keypress START <key>) should change your world.

Contract+Purpose Statement		->
name	Domain	Ranges
Give Examples		
(EXAMPLE (keypress START)
(make-world		
		<i>)</i>
(EXAMPLE (keypress START)
(make-world		
),

(EXAMPLE	(keypress START (make-world)
))
(cond	()	
[()	
[()	_]
		 	_]
[()	
]))

Extended update-world:

;off-right?:	->	·
name	domain	range
(EXAMPLE ())
(EXAMPLE ())
(define ())
; _off-left?:	->	
(EXAMPLE ())
(EXAMPLE ())
(define ())
;	_ :	->
(EXAMPLE ())
(EXAMPLE ())
(define ())
;	_ :	->
(EXAMPLE ())
(EXAMPLE ())
(define ())

TEST		RESULT
	(make-world	
)
	(make-world	
	_)
	(make-world	
	_)
	(make-world	
	_	

Design Recipe: line-length
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.

Contract+Purpos	se Statement			
Every contract ha	as three parts:			
•	·		>	
name		Domain	Range	
Give Examples				
(EXAMPLE	()
(EXAMPLE	()
Function Header				
Write the	Function Header, giving	variable names to all your in	nput values that change.	
(define ()	
	function name	variable names		
)				
,				

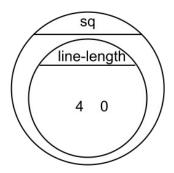
Distance:

The Player is at (4, 2) and the Target is at (0, 5). Distance takes in the player-x, player-y, character-x and character-y.

Use the formula below to fill in the EXAMPLE:

$$\sqrt{\left(line-length~~4~~0~
ight)^{~2}~+~\left(line-length~~2~~5~
ight)^{~2}}$$

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



Convert it into Racket code: (EXAMPLE ()
(

Distance = ((ch takes FOUR inputs: he player he player nother game character		
Contract+Purpose Statement			
name •	Domain	> Range	
;	What does the function do?		
Give Examples			
(EXAMPLE ()	,
(EXAMPLE)	_)
			/
(define (variable names)	
)

DESIGN RECIPE: COLLIDE?

ontract+Purpose Stateme	nt	
name •	Domain	-> Range
	What does the function do?	
ive Examples		
EXAMPLE		
		,
(/
		1
		/
EXAMPLE		
()
)
unction Header		
unction neader		

TEST		RESULT
	(make-world	
	_	
	(make-world	
	_	
	(make-world	
	_)
	(make-world	
		
	_	

Supplemental

DESIGN RECIPE

:	:		->	
name		Domain	Range	
;	What do	pes the function do?		
C: -	What do	cs the function do.		
Give Examples On the computer,	write an example of you	ır function in action, u	sing EXAMPLE.	
(EXAMPLE (the user types))
	tne user types	wnicn	snould become	
(EXAMPLE (the user types))
,	the user types	which	should become	
Function				
	changes in the EXAMPLES ode, copying everything	-	les. using names where you find	
(define ())

DESIGN RECIPE

:	:		->	
name		Domain	Range	
;	What do	pes the function do?		
C: -	What do	cs the function do.		
Give Examples On the computer,	write an example of you	ır function in action, u	sing EXAMPLE.	
(EXAMPLE (the user types))
	tne user types	wnicn	snould become	
(EXAMPLE (the user types))
,	the user types	which	should become	
Function				
	changes in the EXAMPLES ode, copying everything	-	les. using names where you find	
(define ())

TEST	RESULT	
	(make-world	
	_)
	(make-world	
)
	(make-world	
	_)
	(make-world	
	_)