## Contracts

| Name | Domain | Range    | example |
|------|--------|----------|---------|
| ••   | •      | <b>^</b> |         |
| ••   | •      | <b>↑</b> |         |
| ••   | •      | <b></b>  |         |
| ••   | •      | <b>↑</b> |         |
| ••   |        | <b>↑</b> |         |
| ••   | •      | <b>↑</b> |         |
| ••   | •      | <b>↑</b> |         |
| ••   | :      | <b>↑</b> |         |
| ••   |        | <b>^</b> |         |
| ••   |        | <b>↑</b> |         |
| ••   | •      | <b></b>  |         |
| ••   | :      | <b>↑</b> |         |
| ••   |        | <b>^</b> |         |
| ••   | •      | <b>↑</b> |         |
| ••   | •      | <b>↑</b> |         |
| ••   |        | <b>↑</b> |         |
| ••   | ••     | <b>↑</b> |         |

# **Contracts**

| example |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Range   | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>^</b> | <b>↑</b> | <b>1</b> | <b>↑</b> | <b>^</b> | <b>↑</b> | <b>↑</b> | <b>↑</b> | <b>^</b> | <b>↑</b> | <b>^</b> | <b>1</b> | <b>↑</b> |
| Domain  |          |          | <u></u>  | •        | •        | •        | <u></u>  | :        | •        | •        | :        | :        | •        | •        | :        | •        | <u>.</u> |
| Name    |          | ••       | ••       | ••       | ••       | ••       | ••       | ••       | ••       | ••       | ••       | •        | ••       | ••       | ••       | :        | ••       |

#### Reverse-Engineering: How does NinjaCat work?

| Thing in the game | What changes about it? | More specifically |
|-------------------|------------------------|-------------------|
| cloud             | position               | x-coordinate      |
| Cat               | Position               | X,y coordinates   |
| Ruby              | Position               | x-coordinate      |
| Dog               | Position               | Y-coordinate      |
| Score             | Value                  |                   |
| Background        | Nothing                |                   |
|                   |                        |                   |
|                   |                        |                   |
|                   |                        |                   |
|                   |                        |                   |
|                   |                        |                   |
|                   |                        |                   |
|                   |                        |                   |
|                   |                        |                   |

#### Finding Coordinates



The coordinates for the PLAYER (NinjaCat) are: (150, 50) x-coordinate y-coordinate

The coordinates for the DANGER (Dog) are: ( 450 , 50 )

The coordinates for the TARGET (Ruby) are: (550, 250)

#### **Our Videogame**

| Created by (write your names):                              |  |
|---|--|
| Background  |  |
| Our game takes place in: A zoo (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 Escaped gazelle                             |  |
| The Target moves only to the left and right.                |  |
| The Danger  |  |
| Your player LOSES points when they hit the danger.          |  |
| The Danger is aZookeeper                                    |  |
| 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                 | 5 10                                  | 5 * 10             |
| 8 + (5 × 10)           | 8                                     | 8 + (5 * 10)       |
| (8 + 2) - (5 x 10)     | * * * * * * * * * * * * * * * * * * * | (8+2) - (5 * 10)   |
| <u>5 x 10</u><br>8 - 2 | * 5 10 8 2                            | (5 * 10) / (8 - 2) |

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

|         | Circles Co<br>minutes |                      | Time: 5           |
|---------|-----------------------|----------------------|-------------------|
|         | Math                  | Circle of Evaluation | Pyret Code        |
| Round 1 | (3 x 7) - (1 + 2)     | * 1 2                | (3 * 7) - (1 + 2) |
| Round 2 | 3 - (1 + 2)           | 3 + 1 2              | 3 - (1 + 2)       |
| Round 3 | 3 - (1 + (5 x 6))     | 3                    | 3 - (1 +(5 * 6))  |
| Round 4 | (1 + (5 x 6)) - 3     | 1 (5 6) 3            | (1 + (5 * 6)) - 3 |

| Fas | t Functions    |                            |                        |     |
|-----|----------------|----------------------------|------------------------|-----|
| #   | gt             | . Number                   | -> Image               |     |
|     | name           | domain                     | range                  |     |
| exa | mples:         |                            |                        |     |
| _   | gt (7          | $_{}$ ) is $_{}$ triangle( | (7, "solid", "green")  |     |
| _   | gt ( 500       | ) istriangle(              | 500, "solid", "green") |     |
| end |                |                            |                        |     |
| fun | gt(_size       | _):triangle( size, "s      | olid", "green")        | end |
|     | · · ·          | ,                          | -                      |     |
| #_  | bc             | : Number                   | ->Image                | _   |
|     | name           | domain                     | range                  |     |
| exa | amples:        |                            |                        |     |
| _   | gt ( <u>19</u> | ) iscircle(1               | 9, "solid", "blue")    |     |
| _   | gt ( <u>43</u> | ) iscircle(4               | 3, "solid", "blue")    |     |
| end | d              |                            |                        |     |
| fur | າ bc (size     | ):circle(_size, "sol       | lid", "blue")          | end |
|     | ,              |                            |                        |     |
| #_  | dot            | : String                   | ->Image                | _   |
|     | name           | domain                     | range                  |     |
| exa | amples:        |                            |                        |     |
| _   | dot("blue"     | ) iscircle(2               | 0, "solid", "blue")    |     |
| _   | dot ( "red     | ) iscircle(2               | 0, "solid", "red")     |     |
| end | d              |                            |                        |     |
| fur | _              | ):                         | d". color)             | end |
|     |                |                            |                        |     |

| _    | _     |       |     |
|------|-------|-------|-----|
| Fast | Hiina | ctior | ) C |
| IUSL | ı aıı | CLIOI | 2   |

# \_\_\_\_\_ g \_\_\_\_ : Number \_\_\_\_ -> \_\_\_\_ Number \_\_\_\_ range

#### examples:

end

fun <u>g (q</u>): <u>20\*q</u> end

# h : Number -> Number

name domain range

#### examples:

<u>h</u> (<u>10</u> ) is <u>10/2</u> <u>h</u> (<u>15</u> ) is <u>15/2</u>

end

fun h(x): x/2 end

# \_\_\_\_\_\_: \_\_\_\_\_-> \_\_\_\_\_\_ range

#### examples:

end

\_\_\_\_(\_\_\_\_) 1

fun \_\_\_\_\_(\_\_\_): \_\_\_\_\_ end

|   | <br> |  |
|---|------|--|
| · |      |  |

#### 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.

| <ol> <li>Contract+Purpose Sta</li> </ol>    | atement                             |   |
|---|-------------------------------------|---|
| Every contract has three parts:             | :                                   |   |
|   |                                     |   |
| # .   |                                     | _ \   |
| name •                                      | Domain                              | Range   |
|   |                                     | Harrige                                       |
| #   |                                     |   |
| #   | What does the function do?          |   |
| II. Give Examples                           |                                     |   |
| On the computer, write an exa               | mple of your function in action, us | ing FXAMPLE.                                  |
| on the compact, mile an exa-                | p.e er yeur ramenen in aenen, ae    | 9 =/0 ==.                                     |
| /EVAMBLE /                                  |                                     | ,   |
|   |                                     | )   |
| the u                                       | user types                          |   |
|   |                                     |   |
| UNUSED -                                    | - See pages                         | /rocket-                                      |
|   | which should become                 | <u>/ :                                   </u> |
| <u>hoidht sc</u>                            | rh                                  |   |
| neightise                                   |                                     |   |
|   |                                     |   |
| /EVAMBLE /                                  |                                     | `   |
| •   |                                     | )   |
| the u                                       | user types                          |   |
|   |                                     |   |
|   |                                     | )   |
|   | which should become                 |   |
|   |                                     |   |
| III. Definition  Write the definition givin | ng variable names to all your inpu  | t values                                      |
| write the definition, giving                | ng variable hames to all your inpu  | t values.                                     |
|   |                                     | _   |
| (define (                                   |                                     | )   |
| function name                               | variable names                      |   |
|   |                                     |   |
|   |                                     | _   |
|   |                                     | )   |
| and the co                                  | omputer does this                   | <del></del> -                                 |

#### DESIGN RECIPE

#### 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.

| ::                              |                               | ->            |
|---------------------------------|-------------------------------|---------------|
| Name                            | Domain                        | Range         |
|                                 |                               |               |
| Wha                             | at does the function do?      |               |
| Give Examples                   |                               |               |
| the computer, write an example  | of your function in action, u | sing EXAMPLE  |
| EYAMDI E <i>l</i>               |                               | 1             |
| EXAMPLE ( the user say          | ys                            | /             |
|                                 |                               |               |
|                                 |                               | `             |
|                                 | Racket replies                | )             |
|                                 | ·                             |               |
| UNUSED - S                      | an nage                       | s/red-        |
| ONOSED - S                      | ice pages                     | ) i Cu        |
| Square.scr                      | <b>3</b>                      | )             |
| Squal Cisus a                   | <b>y</b> .                    |               |
|                                 |                               |               |
|                                 |                               | )             |
|                                 | Racket turns that into        |               |
| I. Definition                   |                               |               |
| Write the definition, giving va | riable names to all your inp  | ut values.    |
|                                 |                               | 1             |
| dofina (                        |                               | )             |
|                                 | variable names                | <del></del> ′ |
| define (                        | variable names                | <u> </u>      |
| define (                        | variable names                |               |

#### 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 Stat        | ement                                     |             |
|---------------------------------|---|-------------|
| Every contract has three parts: | <u>cc.</u>                                |             |
|                                 |   |             |
|                                 |   |             |
| name :                          | >   | >           |
| name                            | Domain                                    | Range       |
|                                 |   |             |
|                                 | What does the function do?                |             |
|                                 | What does the function do.                |             |
| II. Give Examples               |   | EVANABLE    |
| On the computer, write an exam  | ple of your function in action, usir      | ng EXAMPLE. |
| (EXAMPLE(                       |   | 1           |
| Use the                         | e function here                           | /           |
|                                 |   |             |
|                                 |   |             |
|                                 |   | )           |
|                                 | find another way to get the same result I | nere        |
|                                 |   |             |
|                                 |   |             |
| WINLISED -                      | See pages, e function here                | /lawn-      |
| Use the                         | e function here                           |             |
| area.scrbl                      | Tanetion herein                           |             |
| area.SCIDI                      |   |             |
|                                 |   | )           |
|                                 | find another way to get the same result I | nere ,      |
| III. Definition                 |   |             |
|                                 | g variable names to all your input        | values.     |
| g de                            | g variable names to an your input         | values.     |
| (define (                       |   | )           |
| function name                   | variable names                            | <b></b> ′   |
|                                 |   |             |
|                                 |   | \           |
| and the same                    | nutor does this                           | J           |
| and the com                     | puter does triis                          |             |

#### DESIGN RECIPE

#### 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.

| I. Contract+Purp                      |                       |                        |               |       |
|---------------------------------------|-----------------------|------------------------|---------------|-------|
| Every contract has thr                | ee parts:             |                        |               |       |
|                                       |                       |                        |               |       |
| : :                                   |                       |                        | ->            |       |
| ; : _                                 |                       | Domain                 |               | Range |
| _                                     |                       |                        |               |       |
| ·<br>·                                | What door             | the function do?       |               |       |
|                                       | what does             | the function do:       |               |       |
| II. Give Examples                     |                       | un finnstian in a stie | TVA           | MDLE  |
| On the computer, write                | e an example of you   | ur function in actio   | on, using EXA | MPLE. |
| (EXAMPLE(                             |                       |                        | )             |       |
| · · · · · · · · · · · · · · · · · · · | Use the function h    | ere                    |               |       |
|                                       |                       |                        |               |       |
|                                       |                       |                        | - /           |       |
| UNUSE                                 | ) - <b>Se</b> (       | ) Dage                 | S/UP          | eate- |
| _                                     |                       | wa to get the ame      | - Testyt Here |       |
| danger.                               | scrbi                 |                        |               |       |
|                                       |                       |                        | `             |       |
| (EXAMPLE(                             | Use the function h    | oro                    | )             |       |
|                                       | ose the function in   | CiC                    |               |       |
|                                       |                       |                        |               |       |
|                                       |                       |                        |               | )     |
|                                       | find anothe           | er way to get the same | e result here |       |
| III. Definition                       |                       |                        |               |       |
| Write the definit                     | ion, giving variable  | names to all your      | input values  | · ·   |
| / d a <b>£</b> '.a a /                |                       |                        | `             |       |
| (define (                             |                       |                        | )             |       |
| tunction                              | n name                | variable name          | es            |       |
|                                       |                       |                        |               | ,     |
|                                       |                       | Al- t-                 |               | )     |
|                                       | and the computer does | tnis                   |               |       |

#### Word Problem: update-target

Write a function  $\underline{update-target}$ , which takes in the target's x-coordinate and produces the next x-coordinate, which is 50 pixels to the right.

| I. Contract+Purpose St         |   |              |
|--------------------------------|---|--------------|
| Every contract has three parts | S:                                      |              |
|                                |   |              |
|                                |   | _            |
| ;::                            |   | >            |
| name                           | Domain                                  | Range        |
|                                |   |              |
| ,                              | What does the function do?              |              |
|                                | what does the function do:              |              |
| II. Give Examples              |   |              |
| On the computer, write an exa  | ample of your function in action, us    | ing EXAMPLE. |
| /EVANADLE/                     |   | ,            |
| (EXAMPLE(                      | the function here                       | )            |
| Use                            | the function here                       |              |
|                                |   |              |
|                                |   | 1            |
|                                | find another way to get the same result | /<br>- here  |
|                                | mid dilother way to get the same result | There        |
| IIIIICED                       |   | /            |
| UNUSED .                       | - See pades                             | /update-     |
| (EXAMPLE(                      | - See pages                             |              |
| tardet se                      | ្រា tion here                           |              |
| targetise                      |   |              |
|                                |   |              |
|                                |   | )            |
|                                | find another way to get the same result | here         |
| III. Definition                |   |              |
| Write the definition, giv      | ring variable names to all your inpu    | t values.    |
| , <b>.</b>                     | g                                       |              |
| (define (                      |   | )            |
| function name                  | variable names                          | <b>′</b>     |
|                                |   |              |
|                                |   | `            |
|                                |   | )            |
| and the c                      | computer does this                      |              |

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

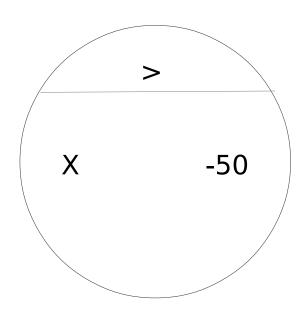
1. A piece of Sam is still visible on the left as long as...

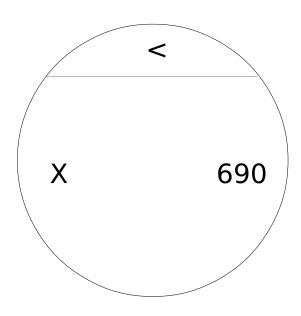
x > -50

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

x < 690

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 safe-left?, which takes in an x-coordinate and checks to see if it is greater than -50.

| What does the function do?  Give Examples In the computer, write an example of your function in action, using EXAMPLE.  EXAMPLE(  | ::   |                                   | >                  |
|---|--|-----------------------------------|--------------------|
| Give Examples In the computer, write an example of your function in action, using EXAMPLE.  EXAMPLE(  | name   | Domain                            | Range              |
| n the computer, write an example of your function in action, using EXAMPLE.  EXAMPLE (  |  | W( )   1   1   5   1   1   2      |                    |
| In the computer, write an example of your function in action, using EXAMPLE.    EXAMPLE(  |  | what does the function do?        |                    |
| Use the function here    The same result here   | <b>I. Give Examples</b><br>On the computer, write an e | xample of your function in action | on, using EXAMPLE. |
| UNUSED – See pages/safe- find another way to get the same result here  EXAMPLE(   | EXAMPLE(   |                                   | )                  |
| Definition  | U  | se the function here              | ,                  |
| (EXAMPLE()  Use the function here  find another way to get the same result here  III. Definition  Write the definition, giving variable names to all your input values.  (define () | HMHICED  | Soo nad                           | oc/cofo-           |
| Use the function here    The same result here   | ONOSED   | find another way to get the same  | e result here      |
| find another way to get the same result here    Definition  | left.scrb  | inia another way to get the same  | - Tesait Here      |
| Ose the function here   )   | EVAMDLE/   |                                   | 1                  |
| II. Definition Write the definition, giving variable names to all your input values.  (define ()  |  | se the function here              | /                  |
| II. Definition Write the definition, giving variable names to all your input values.  (define ()  |  |                                   |                    |
| Write the definition, giving variable names to all your input values.  (define ()   |  |                                   | )                  |
| Write the definition, giving variable names to all your input values.  (define ()   |  | find another way to get the same  | e result here      |
| (define ()  |  | iving variable names to all you   | r innut values     |
|   | _  | iving variable names to an you    |                    |
|   |  | <del></del>                       | )                  |

Word Problem: safe-right?

Use the Design Recipe to write a function  $\underline{safe-right?}$ , which takes in an x-coordinate and checks to see if it is less than 690.

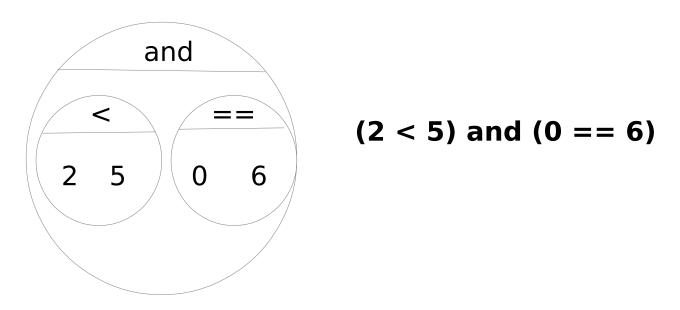
| ;;  |                                     | >              |
|---|-------------------------------------|----------------|
| name  | Domain                              | Range          |
|   |                                     |                |
|   | What does the function do?          |                |
| <b>Give Examples</b> the computer, write an exa | ample of your function in action,   | usina EXAMPLE. |
| ·   |                                     | _              |
| XAMPLE (  | the function here                   | )              |
|   |                                     |                |
|   |                                     | _)             |
| JNUSED -  | Seteway postorers                   | sysafe-        |
|   |                                     | <u> </u>       |
| ight.scrb                                       |                                     | ,              |
| XAMPLE (  | the function here                   | )              |
|   |                                     |                |
|   |                                     | 1              |
|   | find another way to get the same re | sult here      |
| Definition                                      |                                     |                |
| Write the definition, giv                       | ring variable names to all your in  | put values.    |
|   | variable names                      | 1              |
| lefine (  |                                     | 1              |

...and the computer does this

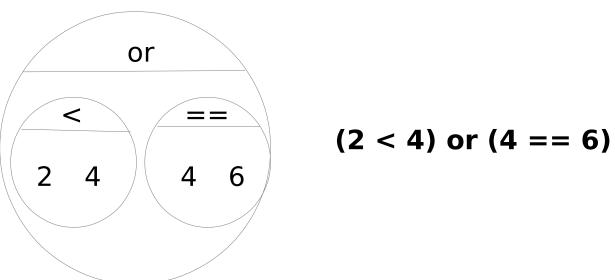
#### and / or

#### Write the Circles of Evaluation for these statements, and then convert them to <a href="Pyret">Pyret</a>

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?

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

| ; :                                       |  | ->             |
|---|--|----------------|
| name                                      | Domain   | Range          |
|   |  |                |
|   | What does the function do?                                   |                |
| I. Give Examples On the computer, write a | an example of your function in action, u                     | ising EXAMPLE. |
| (EXAMPLE(                                 |  | )              |
| (270 11 11 22 (                           | Use the function here  |                |
|   |  |                |
| UNUSE                                     | find another way to get the same resu                        | )              |
|   | _  | <u>_</u>       |
| pages/c                                   | nscreen.scrk   |                |
|   |  | )              |
| (EXAMPLE(                                 |  | /              |
| (EXAMPLE(                                 | Use the function here  |                |
| (EXAMPLE(                                 | Use the function here  |                |
| (EXAMPLE (                                |  | )              |
|   | Use the function here  find another way to get the same resu | )              |
|   |  | ult here       |
|   | find another way to get the same resu                        | ult here       |

#### 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 Stat        | ement                             |                                     |
|---------------------------------|-----------------------------------|-------------------------------------|
|                                 |                                   |                                     |
| name •                          | Domain                            | <b>- &gt;</b><br>Range              |
| II. Give Examples               |                                   |                                     |
| On the computer, write an exam  | ple of your function for <u>e</u> | ach topping, using EXAMPLE.         |
| (EXAMPLE (cost Use the function | <u>"pepperoni"</u> )              | What should the function produce?   |
| (EXAMPLE (                      | )                                 | ) What should the function produce? |
| (EXAMPLE (                      | h here                            | ) What should the function produce? |
| (EXAMPLE (                      | h here                            | ) What should the function produce? |
| III. Definition                 |                                   |                                     |
| (define (                       | variable na                       | imes )                              |
| UNUSED -                        | See                               |                                     |
| pages/cos                       | t.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.

| Contract+Purpose St           | atement       |               |                                  |
|-------------------------------|---------------|---------------|----------------------------------|
| • name                        | Do            |               | <b>-&gt;</b>                     |
| I. Give Examples              |               |               | •                                |
| Finish the two examples we've | _             |               | two more                         |
| EXAMPLE ( <u>update-playe</u> | r 128         | <u>"up"</u> ) |                                  |
| Use the funct                 | /<br>ion here |               | What should the function produce |
| EXAMPLE ( <u>update-playe</u> | r 451 "       | down")        |                                  |
| Use the funct                 | on here       |               | What should the function produce |
| EXAMPLE(                      |               | _)            |                                  |
| Use the funct                 | ion nere      |               | What should the function produce |
| EXAMPLE (                     | ion here      | _)            | What should the function produce |
| II. Definition                |               |               |                                  |
| (define (                     |               |               | )                                |
| function name                 |               | variable na   | mes                              |
|                               | _             | I             |                                  |
|                               |               |               |                                  |
|                               |               |               |                                  |
| HMHSEF                        | - Soc         | n ns          | ages/ <mark>lipd</mark> a        |
|                               |               | - Pc          | iges/upad                        |
| <b>dagens</b>                 |               |               |                                  |
|                               |               |               |                                  |
|                               |               |               |                                  |

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<br>Every contract has three     | e Statement parts:         |                |   |
|---|----------------------------|----------------|---|
| •   | •                          |                | ->  |
| name  |                            | Domain         | Range                                     |
| I. Give Examples                                |                            |                |   |
| (EXAMPLE <u>(line-leng</u> t<br>5) )<br>Use the | th 10 5<br>e function here | )              | (- 10 What should the function produce?   |
| (EXAMPLE <u>(line-lengt</u><br>2) )<br>Use the  | th 2 8<br>function here    | )              | (- 8<br>What should the function produce? |
| Write the definition (define (                  |                            | names to all y | )   |
| UNUSI   | ED - S                     | ee p           | ages/line-                                |
| length  | .scrb                      |                |   |

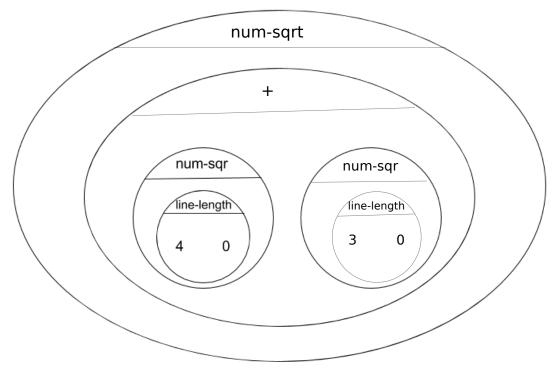
...and the computer does this

#### The Distance Formula (an example)

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

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

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



Convert the Circle of Evaluation into Pyret code:

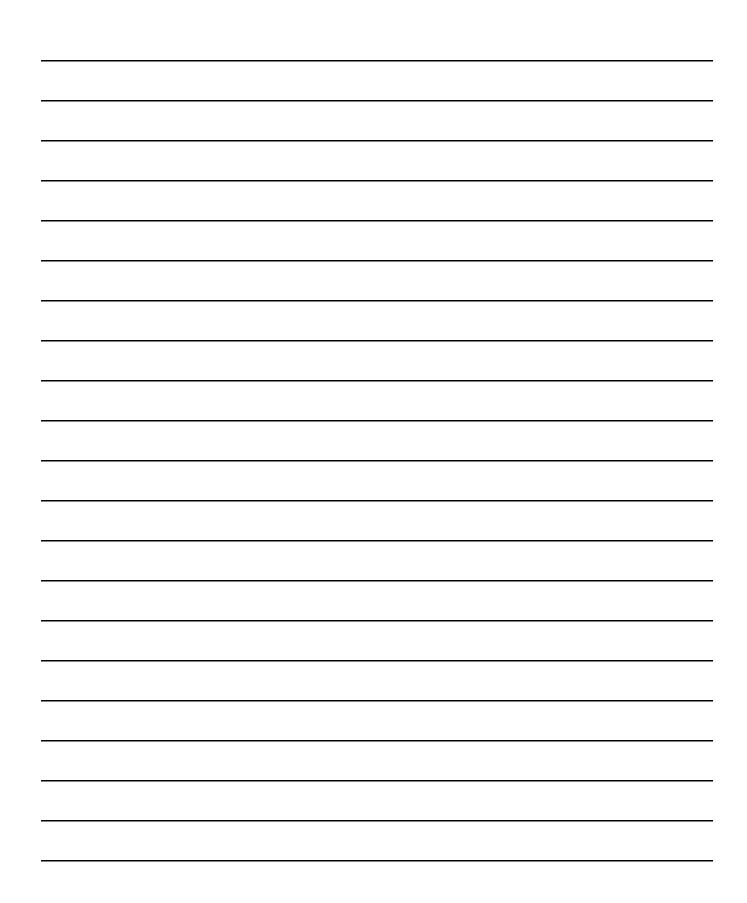
num-sqr(line-length(4, 0)) + (num-sqr(line-length(3, 0)))

| Write a function distance, who px: The x-coordinate of py: The y-coordinate of cx: The x-coordinate of cy: The y-coordinate of | the player<br>the player<br>another game character       |                           |
|--|--|---------------------------|
| It should return the distance b<br>what you did on page 27!)   | etween the two, using the Distance                       | e formula. (HINT: look at |
| I. Contract+Purpose St   | atement  |                           |
| name   | <b>_</b><br>Domain                                       | >                         |
| name   | Domain   | Nange                     |
| ,  | What does the function do?                               |                           |
| II. Give Examples  |  |                           |
| (EXAMPLE(  | the function here  | )                         |
|  |  | )                         |
| pages/dis  | - See find another way to get the same result Lance Scro | : here                    |
|  | the function here  | )                         |
|  | find another way to get the same result                  | here )                    |
| III. Definition  |  |                           |
| (define (  | variable names   | )                         |

Write a function collide?,which takes FOUR inputs:

| ayer ayer ayer er game character er game character ordinates of the player are acter. Otherwise, false. | e within 50 <b>pixels</b> of the  |
|---|---|
| Domain  | ><br>Range  |
| Domain  | Nange   |
| does the function do?   |   |
|   |   |
| ction here  | )   |
| ee<br>another way to get the same res   | sult here   |
| ie.sci bi   |   |
| ction here  | )   |
| another way to get the same re  | sult here   |
|   |   |
| variable names  | )   |
|   | preserved and character for game character for game character for game character for game character. Otherwise, false.  Domain  Domain  It does the function do?  It composes the same reserved for get |

| Catchy Intro: Feel like you never get enough to eat? So does Leo. Come catch your prey,   |
|---|
| and escape the zookeeper!   |
|   |
| Name, Age, Grade: Ellie Programmer, 12, 7 <sup>th</sup> grade   |
| Game Title: Run for your Supper   |
| Back Story:One day, a young lion was sitting in his cage. He saw an escaped gazelle come  |
| running past. It was lunch time, and he was hungry, so he leapt out to catch food.<br>He has  |
| to run fast to grab food and escape the evil zookeeper.   |
| Characters: Player: Leo the lion.   |
| Danger: Zoe Zookeeper.  |
| Target: Gary Gazelle  |
|   |
| Explain a piece of your code: My update-danger function takes in the current x coordinate of the gazelle, and adds 50 to it. This moves the gazelle 50 pixels to the right. |
|   |
|   |
|   |



#### 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

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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 otherwise clause that produces a sensible output.

#### **Contract and Purpose Statement**

Every contract has three parts...

|   | red-sha      | pe | ::    | String |       |    | ->_    | Image |      |  |       |
|---|--------------|----|-------|--------|-------|----|--------|-------|------|--|-------|
|   | function nan | ne |       |        |       |    | domain |       |      |  | range |
| # | Create       | a  | solid | red    | shape | of | the    | given | kind |  |       |

what does the function do?

#### **Examples**

Write some examples, then circle and label what changes...

examples:

```
"circle"
                                          ) is
                                                   circle(50,
                                                                     "solid",
                                                                                   "red")
red-shape
 function name
                                                              what the function produces
                            input(s)
red-shape
                       "triangle"
                                          ) is
                                                   triangle (50,
                                                                       "solid",
                                                               what the function produces
 function name
                           input(s)
                                                                             "solid",
red-shape
                      "rectangle"
                                          ) is
                                                  rectangle (5,
                                                                                           "red")
                                                                  what the function produces
 function name
                            input(s)
                          "star"
                                                   star(50,
                                                                 "solid",
                                                                                "red")
red-shape
                                          ) is
 function name
                            input(s)
                                                            what the function produces
                       "garbanzo"
                                                   text("???", 20,
                                                                             "red")
red-shape
                                          ) is
 function name
                            input(s)
                                                           what the function produces
```

end

#### **Definition**

Write the definition, given variable names to all your input values...

```
fun
      red-shape
                                       ):
                           shape
        function name
                            variables
   if
          "circle" ==
                                                circle(50,
                                                              "solid",
                          shape
                "triangle"
                                                                 "solid",
   else if
                                  shape
                                               : triangle(50,
                                                                            "red")
   else if
                "rectangle"
                                               : rectangle(9,
                                                                 "solid",
                                   shape
   else if
                "star"
                                               : star(50,
                                                            "solid",
                                                                        "red")
                        ==
                             shape
                               <u>"red"</u>)
           text(20, "???",
   else:
   end
end
```

#### Translating into Algebra

#### **Value Definitions**

| Pyret Code                        | Algebra                       |
|-----------------------------------|-------------------------------|
| x = 10                            | x = 10                        |
| y = x * 2                         | y = x*2                       |
| z = x / y                         | $z = x \div y$                |
| w = num - sqrt(num - sqr(x) + 1)  | $\mathbf{w} = \sqrt{x^2 + 1}$ |
| days = (age * 12) * 30            | days = (age * 12) * 30        |
| y = (v * x) + x0                  | $y = (v * x) + x_0$           |
| y = ((0.5 * a) * num-sqr(x)) + y0 | $y = (0.5 * a) * x^2 + y_0$   |

#### **Function Definitions**

| Pyret Code   | Algebra  |
|--|--|
| fun area(length, width): length * width end  | area(length, width) = length * width                   |
| <pre>pi = 3.1415926 fun circle-area(radius):   pi * num-sqr(radius) end</pre>                                | circle-area(radius) = pi * radius²                     |
| <pre>fun distance(x1, y1, x2, y2):    num-sqrt(      num-sqr(x1 - x2)      + num-sqr(y1 - y2)    ) end</pre> | distance(x1, y1, x2, y2)= $\sqrt{(x1-x2)^2+(y1-y2)^2}$ |

A rocket is flying from Earth to Mars at 80 miles per second. Write a function that describes the  $\underline{\textbf{distance}}\ D$  that the rocket has traveled, as a function of  $\underline{\textbf{time}}\ t$ .

|               | D                   | :     | Number   | ->       | Number     |                |
|---------------|---------------------|-------|--|----------|------------|----------------|
|               | name                |       | Domain   |          | Range      | _              |
| # _           | Given a n<br>80mi/s | umber | of seconds, produces the I  What does the function do? | height o | f a rocket | <u>m</u> oving |
|               | OUIII/S             |       | what does the function do?                             |          |            |                |
|               | Give Exar           | nples |  |          |            |                |
|               |                     |       | function for <u>some sample inputs</u>                 | <u> </u> |            |                |
|               | D(1)                | is    | 80 * 1   |          |            |                |
| Jse th        | he function here    |       | What should the function produ                         | uce?     |            |                |
|               | D(2)                | is    | 80 * 2   |          |            |                |
| Jse th        | he function here    |       | What should the function produ                         | uce?     |            |                |
|               | D(14)               | is    | 80 * 14  |          |            |                |
| Jse th        | he function here    |       | What should the function produ                         | uce?     |            |                |
|               | D(100)              | is    | 80 * 100   |          |            |                |
| Jse th        | ne function here    |       | What should the function produ                         | uce?     |            |                |
|               | Dofinition          |       | ·  |          |            |                |
| III.<br>Nrite |                     |       | variable names to all your input                       | values.  |            |                |
|               |                     | , 5   |  |          |            |                |
| fui           | n D( <b>ti</b>      | me )  | : 80 * time  |          |            |                |
| end           | 7                   |       |  |          |            |                |

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>.

| I. Contract+          | Purpo      | e Statement                |                    |                |
|-----------------------|------------|----------------------------|--------------------|----------------|
| Every contract ha     |            |                            |                    |                |
| time                  | :          | Number                     | ->                 | Number         |
| name                  |            | Domain                     |                    | Range          |
| # Given the di        | stance     | traveled, produce the tir  | ne traveled if mov | ving at 80mi/s |
|                       |            | What does the function     | on do?             |                |
|                       |            |                            |                    |                |
| II. Give Exam         | ples       |                            |                    |                |
|                       |            | function for some sample   | <u>inputs</u>      |                |
| time(0)               | is         | 0 / 80                     |                    |                |
| Use the function here |            | What should the function   | n produce?         |                |
| time(10)              | is         | 10 / 80                    |                    |                |
| Use the function here |            | What should the function   | n produce?         |                |
| time(200)             | is         | 200 / 80                   |                    |                |
| Use the function here |            | What should the function   | n produce?         |                |
| time(560)             | is         | 560 / 80                   |                    |                |
| Use the function here |            | What should the function   | n produce?         |                |
| III. Definition       |            |                            |                    |                |
|                       | aivina     | variable names to all your | innut values       |                |
| vviice the fanction   | i, givilig | variable names to all your | input values.      |                |
| fun <b>time</b> (     | dis        | tance):                    | distance /         | 80             |
| 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. Contract+ Every contract has      |           | se Statement                  |                |              |                |             |
|--------------------------------------|-----------|-------------------------------|----------------|--------------|----------------|-------------|
| Every contract na.                   | 3 till CC | purcs.                        |                |              |                |             |
| collide                              | :         | Number                        |                | ->           | Number         |             |
| name                                 |           |                               | Domain         |              | Range          | _           |
| #Given the distant                   | ce betw   | een a rocket (moving a        | t 80mi/sec)    | & asteroid ( | 70mi/sec), whe | n will they |
| collide?                             |           | What does the                 | e function do? | ,            |                | •           |
| II. Give Exam                        | ples      |                               |                |              |                |             |
|                                      |           | function for some sa          | ample inpu     | <u>ts</u>    |                |             |
| collide(0)                           | is        | 0 / 150                       |                |              |                |             |
| Use the function here                | 13        | What should the               | function pro   | duce?        |                |             |
| collide (2000) Use the function here | is        | 2000 / 150<br>What should the | a function pro | duce?        |                |             |
| OSE THE TURCHOR HERE                 |           | What should the               | tunction pro   | duce:        |                |             |
| collide(5000)                        | is        | 5000 / 150                    |                |              |                |             |
| Use the function here                |           | What should the               | function pro   | duce?        |                |             |
| collide(15000                        | ) is      | 15000 / 150                   |                |              |                |             |
| Use the function here                |           | What should the               | function pro   | duce?        |                |             |
| III. Definition                      |           |                               |                |              |                |             |
| Write the function                   | , giving  | variable names to a           | ll your inpu   | ıt values.   |                |             |
| fun <b>colli</b> end                 | de (      | distance                      | ):             | distan       | ice / 15       | 0           |

| I. Contract+Purpos                    | se Statement                            |       |
|---------------------------------------|---|-------|
| Every contract has three              | parts:                                  |       |
|                                       |   |       |
| :_                                    |   | ->    |
| name                                  | Domain                                  | Range |
| #                                     |   |       |
|                                       | What does the function do?              |       |
|                                       |   |       |
| II. Give Examples                     |   |       |
|                                       | function for <u>some sample inputs</u>  |       |
| , , , , , , , , , , , , , , , , , , , |   |       |
| is                                    |   |       |
| Use the function here                 | What should the function produce?       |       |
| :_                                    |   |       |
| <b>iS</b><br>Use the function here    | What should the function produce?       |       |
| ose 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                       |   |       |
|                                       | variable names to all your input values |       |
|                                       | Tanana names to an year mpac values     | -     |
| fun                                   | ( ):                                    |       |
| _                                     | \                                       |       |
| end                                   |   |       |