Question 1: Lists are fun!

Someone wrote this procedure `list-fun.`

```
 (define (list-fun x)

  (if (or (null? x) (not (list? x)))

      (list x)

      (let ((elem (car x)))

                (map (lambda (y) (cons elem (list-fun y))) x))))
```

a) What does the procedure `list-fun` return for x = a

```
(list-fun ‘a) ➔
```

b) What does the procedure `list-fun` return for `x = ‘(a)`

```
(list-fun ‘(a)) ➔
```

c) What does the procedure `list-fun` return for `x = ‘(a b c)`

```
(list-fun ‘(a b c)) ➔
```

d) What is the length of the list returned for `x = ‘((a) (b) (c))`

```
(length (list-fun ‘((a) (b) (c))) ➔
```

e) What is the domain of `list-fun`?

Question 2: Party!

To plan an upcoming party you make an association list of ingredients that you need and their cost.

```
(define simple-grocery-L  ‘((cake-mix 2) (eggs 3) (soda 2)))
```

But what would be really cool is if you could figure out how much a `cake`, which is made up of `cake-mix` and `eggs`, would cost. You’ve made up a more complicated version of your old grocery list. It has both individual items and their costs AND composite items and their ingredients. For example:

```
(define complex-grocery-L
        ‘((cake cake-mix eggs)
         (strawberry-shortcake cake strawberries whipped-cream)
         (cake-mix      2)
         (eggs          3)
         (strawberries  4)
         (whipped-cream 3)
         (soda          5)
         (salsa         3)
         (chips         4)))
```

Now you can write a procedure to calculate the total cost of your menu. For example:

```
(total-cost ‘(chips soda) complex-grocery-L) ➔ 9
(total-cost ‘(cake) complex-grocery-L) ➔ 5
(total-cost ‘(strawberry-shortcake) complex-grocery-L) ➔ 13

 (total-cost ‘(strawberry-shortcake chips soda) complex-grocery-L)
                                                              ➔ 22
```

```
(define (total-cost menu grocery-info)
```

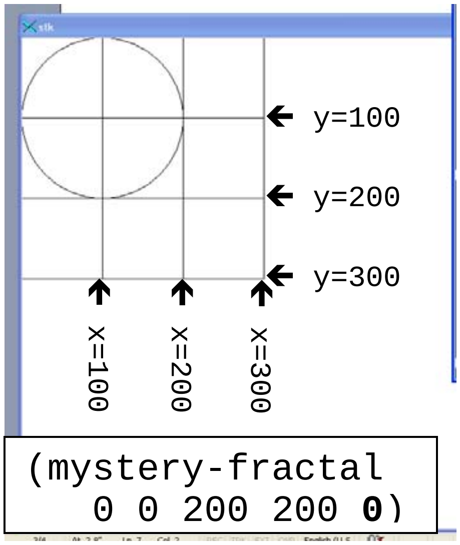
Question 3: Fractals

We've got a cool new fractal for you to try! It has ovals in it – so here is a helper procedure to draw ovals. The new fractal is called `mystery-fractal`. **The squares are NOT part of the fractal! They are just to show scale! The scale is the same in each image.**

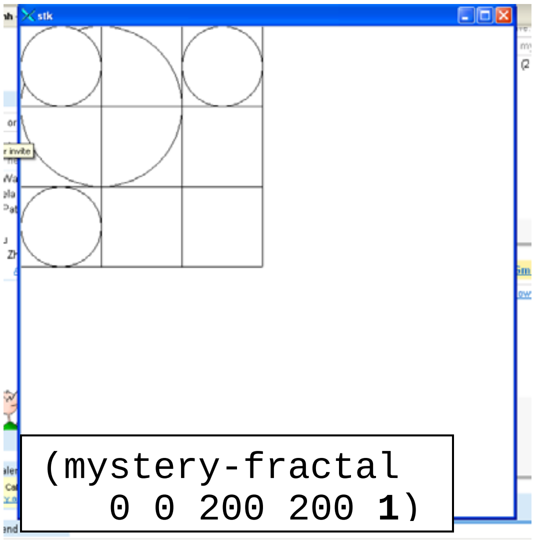
```
(define (draw-white-oval x1 y1 x2 y2)
        (draw-oval x1 y1 x2 y2 'fill 'white))
```

a) Draw the picture for `mystery-fractal` for `n=2`.

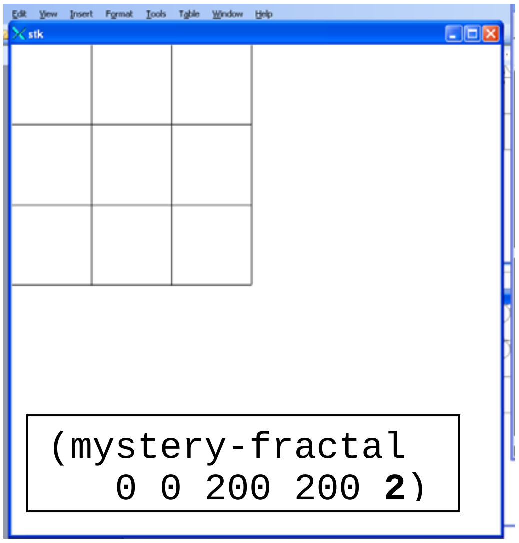
b) Fill in the blank for `n` in the 4th picture



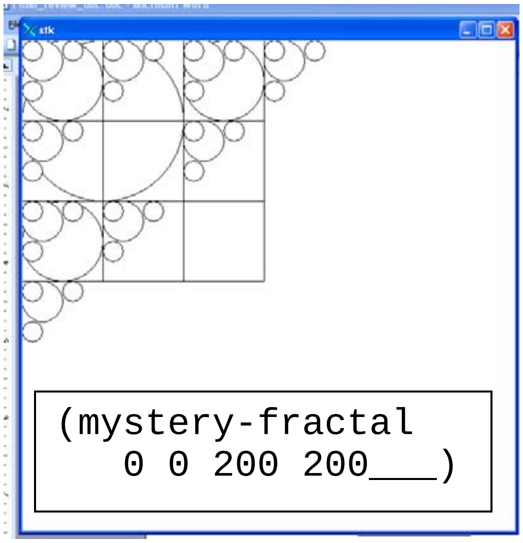
```
(mystery-fractal
   0 0 200 200 0)
```



```
(mystery-fractal
   0 0 200 200 1)
```



```
(mystery-fractal
   0 0 200 200 2)
```



```
(mystery-fractal
   0 0 200 200___)
```

Complete the implementation

```
(define (mystery-fractal x1 y1 x2 y2 n)
     (if (< n 0)
           ‘done
           (let ((xmid (/ (+ x1 x2) 2))
                 (ymid (/ (+ y1 y2) 2))
                 (xplus (+ x2 (/ (- x2 x1) 2)))
                 (yplus (+ y2 (/ (- y2 y1) 2))))
```

)))