Second Racket Programming Assignment Specification

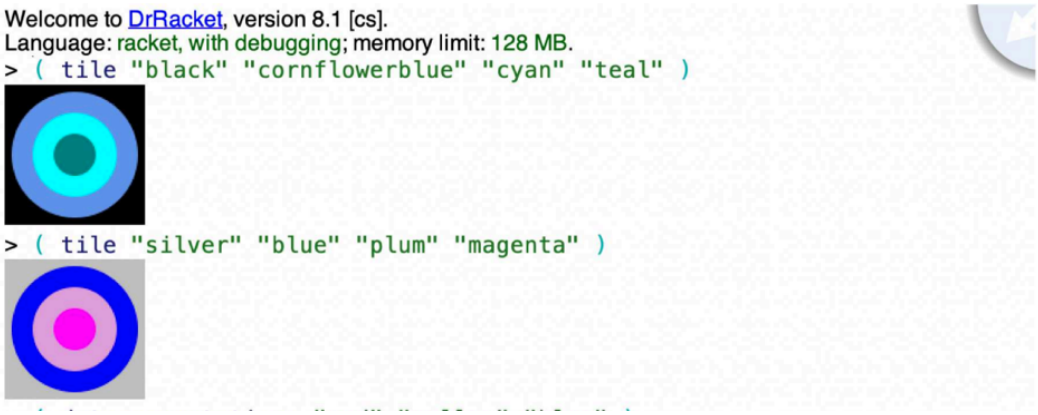
Task 1- Permutations of Randomly Colored Stacked Dots

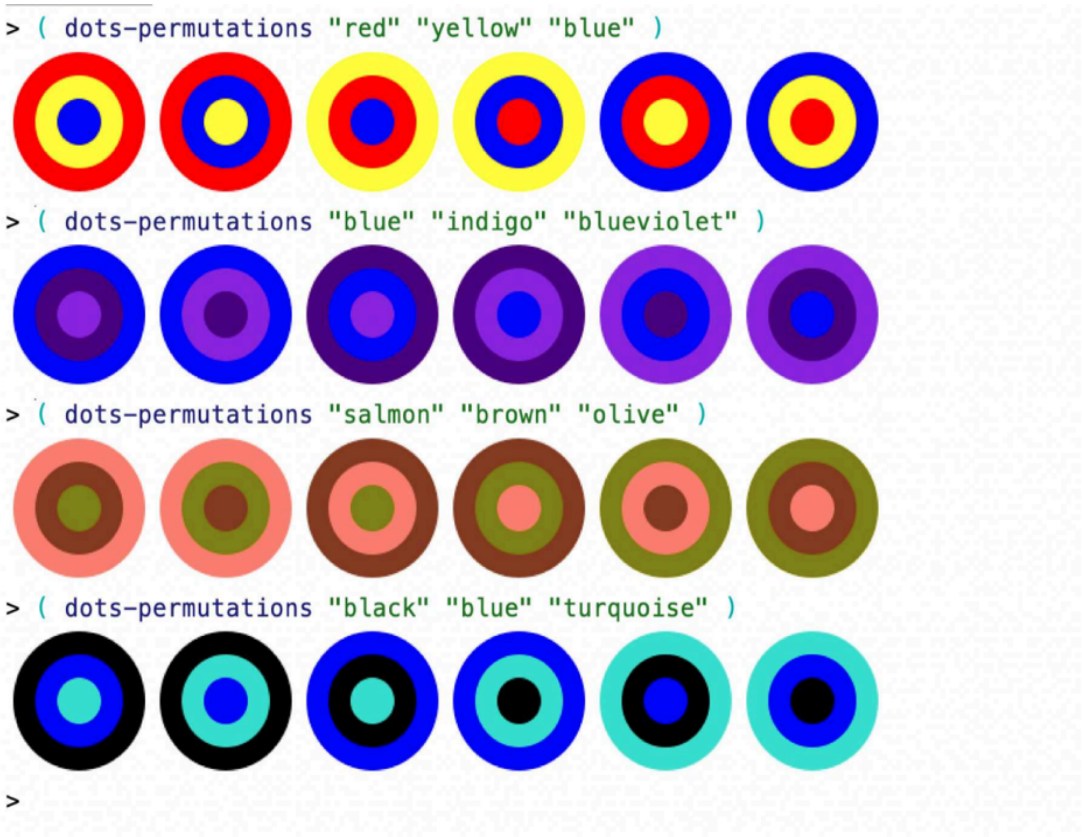
Programming constraint: For this part of your assignment, your are not permitted to use any form of repetition (recursion/iteration) or any form of conditional statement

Write a program called tile which takes four parameters, each presumed to represent a color, which creates an image representing a square tile of side 100 with background defined by the first color, on which are concentrically piled a disk of diameter 90 of the second color, a disk of diameter 60 of the third color, and a disk of diameter 30 of the fourth color. If the words are overwhelming, just look at the examples presented in the
accompanying demo.

Write a program called dots-permutations taking three parameters, each presumed to represent a color, which
creates a row of tiles representing the permutations of three colors, where each permutation is rendered as a
stack of dots of diameters 90, 60, and 30. Please look to the accompanying demo for clarification.

The Demo:





Task 2 : Number Sequences

Programming constraint: For this part of your assignment, your are not permitted to use any form of of iterative construct. Rather, you are required to use recursion.

Write a program called natural-sequence that behaves in the manner suggested by the function of the same name in the accompanying demo.

Write a program called copies that behaves in the manner suggested by the function of the same name in the accompanying demo.

Write a program called natural-sequence that behaves in the manner suggested by the function of the same name in the accompanying demo.

Please generate a demo that is just like the demo provided, except that it includes two more applications of each of the three programs. Thus, your demo will have four applications of natural-sequence (two of mine and two of yours), four applications of copies (two of mine and two of yours), and four applications of special-natural-sequence (two of mine and two of yours).

The Demo:

```
Welcome to DrRacket, version 8.1 [cs].
Language: racket, with debugging; memory limit: 128 MB.
> ( natural-sequence 5 )
1 2 3 4 5
> ( natural-sequence 18 )
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
> ( copies "a" 11 )
a a a a a a a a a a a
> ( copies 9 9 )
9 9 9 9 9 9 9 9 9
> ( special-natural-sequence 5 )
1 2 2 3 3 3 4 4 4 4 5 5 5 5 5
> ( special-natural-sequence 20 )
1 2 2 3 3 3 4 4 4 4 5 5 5 5 5 6 6 6 6 6 6 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 9 9 9 9 9 9 9 9 9
10 10 10 10 10 10 10 10 10 10 11 11 11 11 11 11 11 11 11 11 11 12 12 12 12 12 12 12 12 12
12 12 12 13 13 13 13 13 13 13 13 13 13 13 13 13 14 14 14 14 14 14 14 14 14 14 14 14 14 14
15 15 15 15 15 15 15 15 15 15 15 15 15 15 15 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
16 17 17 17 17 17 17 17 17 17 17 17 17 17 17 17 17 18 18 18 18 18 18 18 18 18 18 18 18 18
18 18 18 18 18 18 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 20 20 20 20 20
20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
>
```

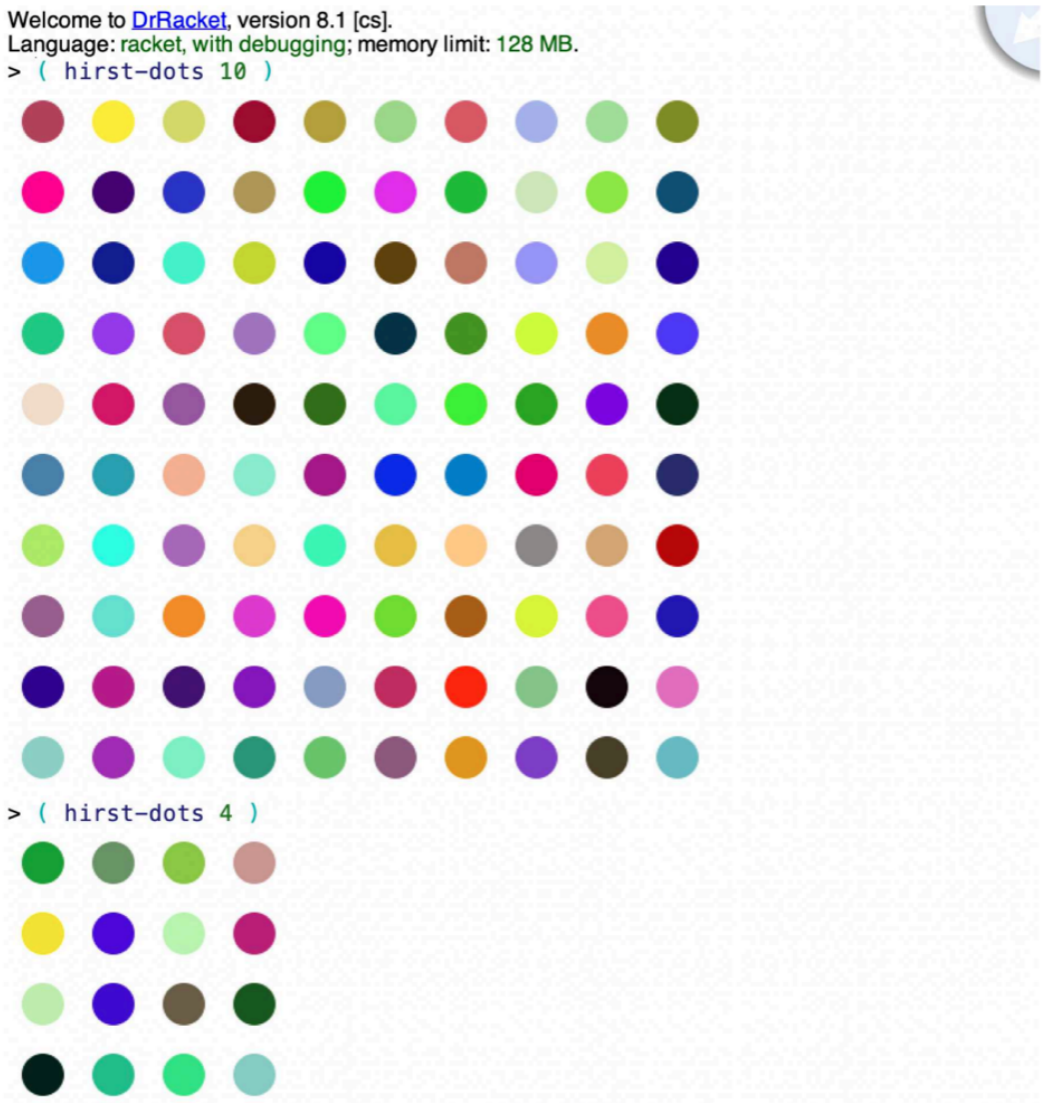
Task 3 : Hirst Dots

Programming constraint: For this part of your assignment, your are not permitted to use any form of of iterative construct. Rather, you are required to use recursion.

Write a function called hirst-dots to draw square arrangements of Hirst dots that are consistent with the accompanying demo. Please arrange for the diameter of the dots to be 30 pixels, and for each dot to be 20 pixels from its nearest dots. Please note that the the parameter is presumed to be a non-negative integer, and that the number of dots in an image is the square of the value of the parameter.

Please generate a demo that displays a 10x10 grid of Hirst dots, and a 4x4 grid of Hirst dots.

The Demo:



Task 4 : Stella Thing

Programming constraint: For this part of your assignment, your are not permitted to use any form of iterative construct. Rather, you are required to use recursion.

Write a function called stella to display graphical images in the spirit of Frank Stella subject to the following
constraints:
(a) Your program must be based on a shape other than either of those that I used in the Stella section Lesson

Thus, you must not use either a square or a star for it. Perhaps you would like to use a circle, or an ellipse, or a wedge, or a triangle, or rhombus, or a regular polygon, or a star-polygon. Maybe something else! Please find your way to the documentation for the 2htdp/image library and find some functionality with which to do the deed:
https://docs.racket-lang.org/teachpack/2htdpimage.html

(b) Your program must be consistent with one of the two varieties of Stella that were presented in Lesson 4. That is, speaking in the terminology dropped in the lesson, you must do a monochromatic shape, or a two tone shape.

Please generate a sound demo for your program, one that displays at least two different images in the family
of images that your program produces.

Task 5: Creation

Programming constraint: For this part of your assignment, your are not permitted to use any form of iterative construct. Rather, you are required to use recursion for any repetition that you would like to accomplish.

Please define a function called my-creation to produce an interesting image using some of the more involved functionality in the 2htdp/image library. Perhaps use some of the more elaborate overlay commands (maybe overlay/offset or overlay/xy), or maybe some of the rotating, scaling, flipping, cropping, and framing functionality. Again, here is the place to go to find some useful functionality:
https://docs.racket-lang.org/teachpack/2htdpimage.html

Please generate a sound demo for your program, one that displays your image.