

Assignment #1

Trevor Strickland, CSC344

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Learning Abstract: This assignment is an introductory venture into programming with Racket, using the interactions section with no pre-defined functions of the user's creation. This assignment is meant to familiarize the student with basic Racket syntax, and introduce the concept of functional programming through short coding exercises. In this assignment, I had to learn how arithmetic functions within Racket (syntactically), as well as introduce myself to the image library and interact with Racket's drawing functions.

Task A: Numeric Computations

Code:

```
> 2
2
> 5.6
5.6
> pi
3.141592653589793
> ( + 4 5 )
9
> ( * 4 5 )
20
> ( + ( * 81 23 ) 566 )
2429
> ( expt 4 7 )
16384
> ( * pi (expt 11 2) )
380.132711084365
> ( expt 81 81 )
38662196978715633273404758790074316960214213096178319621856934259807530937321
86148519250854287347063750116098008179403597021967023840707878813593137178248
1
```

Demo:

```
> 2
2
> 5.6
5.6
> pi
3.141592653589793
> ( + 4 5 )
9
> ( * 4 5 )
20
> ( + ( * 81 23 ) 566 )
2429
> ( expt 4 7 )
16384
> ( * pi (expt 11 2) )


380.132711084365
> ( expt 81 81 )
3866219697871563327340475879007431696021421309617831962185693425980753093732186148519250854
2873470637501160980081794035970219670238407078788135931371782481
```

Task B: Area of The Blue Tile

Code:

```
> ( define tile-side 200 )
> ( define dot-diameter ( / tile-side 3 ) )
> ( define dot-radius ( / dot-diameter 2 ) )
> ( define tile-area ( expt tile-side 2 ) )
> ( define red-dot-area ( * pi ( expt dot-radius 2 ) ) )
> ( define blue-tile-area ( - tile-area red-dot-area ) )
> tile-side
200
> dot-diameter
66 2/3
> dot-radius
33 1/3
> tile-area
40000
> red-dot-area
3490.658503988659
> blue-tile-area
36509.341496011344
```

Demo:

```
> ( define tile-side 200 )
> ( define dot-diameter ( / tile-side 3 ) )
> ( define dot-radius ( / dot-diameter 2 ) )
> ( defint tile-area ( expt tile-side 2 ) )
 defint: undefined;
cannot reference an identifier before its definition
> ( define tile-area ( expt tile-side 2 ) )
> ( define red-dot-area ( * pi ( expt dot-radius 2 ) ) )
> ( define blue-tile-area ( - tile-area red-dot-area ) )
> tile-side
200
> dot-diameter
 $66\frac{2}{3}$ 
> dot-radius
 $33\frac{1}{3}$ 
> tile-area
40000
> red-dot-area
3490.658503988659
> blue-tile-area
36509.341496011344
```

Task C: Painting the Tile

```
> (require 2htdp/image)
> ( define tile-side 200 )
> ( define dot-diameter ( / tile-side 3 ) )
> ( define dot-radius ( / dot-diameter 2 ) )
> ( define tile ( square tile-side "solid" "blue" ) )
> tile
> ( define dot ( circle dot-radius "solid" "red" ) )
> dot
> ( overlay dot tile )
```

Demo:

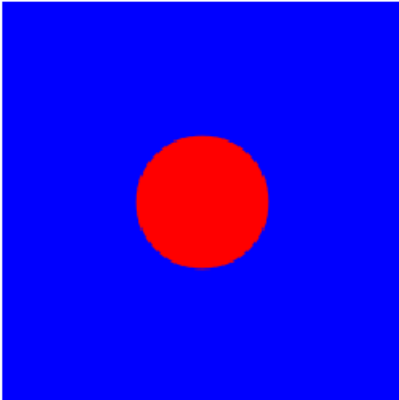
```
> (require 2htdp/image)
> (define tile-side 200)
> (define dot-diameter (/ tile-side 3))
> (define dot-radius (/ dot-diameter 2))
> (define tile (square tile-side "solid" "blue"))
> tile
```



```
> (define dot (circle dot-radius "solid" "red"))
> dot
```



```
> (overlay dot tile)
```



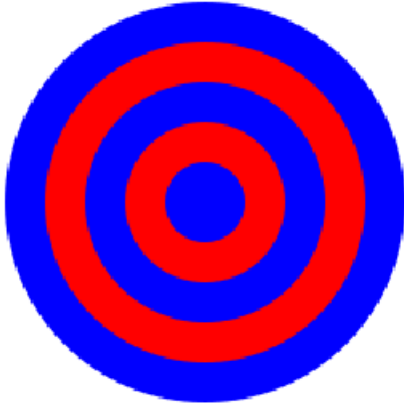
Task D: Concentric Circles

Code:

```
> (define dot-1 (circle 20 "solid" "blue"))
> (define dot-2 (circle 40 "solid" "red"))
> (define dot-3 (circle 60 "solid" "blue"))
> (define dot-4 (circle 80 "solid" "red"))
> (define dot-5 (circle 100 "solid" "blue"))
> (overlay (overlay (overlay (overlay dot-1 dot-2) dot-3) dot-4) dot-5)
)
```

Demo:

```
> (define dot-1 ( circle 20 "solid" "blue" ) )
> (define dot-2 ( circle 40 "solid" "red" ) )
> (define dot-3 ( circle 60 "solid" "blue" ) )
> (define dot-4 ( circle 80 "solid" "red" ) )
> (define dot-5 ( circle 100 "solid" "blue" ) )
> ( overlay ( overlay ( overlay ( overlay dot-1 dot-2 ) dot-3 ) dot-4 ) dot-5 )
```



Task E: The Blue Area

Code:

```
> ( define area-1 ( * pi ( expt 10 2 ) ) )
> ( define area-2 ( * pi ( expt 20 2 ) ) )
> ( define area-3 ( * pi ( expt 30 2 ) ) )
> ( define area-4 ( * pi ( expt 40 2 ) ) )
> ( define area-5 ( * pi ( expt 50 2 ) ) )
> ( define blue-area ( + ( + area-1 area-3 ) area-5 ) )
> ( define red-area ( + area-2 area-4 ) )
> ( define real-blue-area ( - blue-area red-area ) )
> real-blue-area
4712.388980384689
```

Demo:

```
> ( define area-1 ( * pi ( expt 10 2 ) ) )
> ( define area-2 ( * pi ( expt 20 2 ) ) )
> ( define area-3 ( * pi ( expt 30 2 ) ) )
> ( define area-4 ( * pi ( expt 40 2 ) ) )
> ( define area-5 ( * pi ( expt 50 2 ) ) )
> ( define blue-area ( + ( + area-1 area-3 ) area-5 ) )
> ( define red-area ( + area-2 area-4 ) )
> ( define real-blue-area ( - blue-area red-area ) )
> real-blue-area
4712.388980384689
```