

Name : Tian Qiu
PUID: 00265 35063

Homework 1

Problem 1: G & C, Chapter 1, Problem 2 (10 points)

(a) if $x = 3$,
After one step $p(2) = .5$ & $p(4) = .5$
After two steps
 $p(1) = .5 * p(2) + .5 * p(0) = .25$
 $p(3) = 1 - .25 - .25 = .5$
 $p(5) = .5 * p(4) = .25$

(b) Reach the bar first:

$$x = 1$$

Reach home first:

$$x = 4$$

Because $x = 1$ is the closest step to bar and $x = 2$ is the closest step to the home.

Problem 2: A simple economy (10 points)

1. Total Demand = $[8+1+1+8+7, 29, 21] = [25, 29, 21]$
total crude oil industry = $[0, 100, 50]$
total refining industry = $[232, 0, 174]$
total utility industry = $[21, 126, 0]$

2. profit of the crude oil industry is $= [0, 100, 50] * [4, 3, 2]^T = 400$

Problem 3: Adding acceleration to the raptor problem (15 points)

1. Assumption and model:
 - a). Runner will always run at the same speed after acceleration when the time goes on.
 - c). Constant acceleration rate b). The runner will just go in the straight line

v end speed

t end time

$$\text{acceleration } a = \frac{v}{t} \quad \text{distance } s = \frac{t * v}{2} = \frac{a * t^2}{2}$$

2. Immediately begins running at 12 meters-per-second:
distance $s = 12 * t = 12t$ meters
Accelerate to 12 meters-per-second:
distance $s = .5 * 2 * 6 + 12 * (t-6) = 12t - 72 + 6 = 12t - 66$ meters

The distance difference between these two types is 66 meters

Problem 4: Search engines (15 points)

1.

1	0	0
1	1	0
1	0	1
1	1	1

2.

0	0	0	1	0
1	0	0	0	0
1	0	0	0	0
0	1	1	0	1
0	0	1	0	0

3.

0.03
0.03
0.03
0.88
0.03

Problem 5: Intro to Julia (15 points)

```
1 A = [10 -3; 4 2]
2 B = [1 0; -1 2]
3 v = [1; 2]
4 w = [1; 1]
5
6
7 #a
8 v' * w
9 #b
10 v * w'
11 #c
12 A * v
13 #d
14 A' * v
15 #e
16 A * B
17 #f
18 B * A
19 #g
20 A * A
21 #h
22 B \ w
23 #i
24 A \ w
```

1. "5_2.jl" 25L, 135C written

```

julia> x = 0:0.1:2pi
0.0:0.1:6.2

julia> plot!(x, sin(1*x))

julia> plot!(x, sin(1*x))

julia> plot(x, sin(1*x))

julia> plot!(x, sin(2*x))

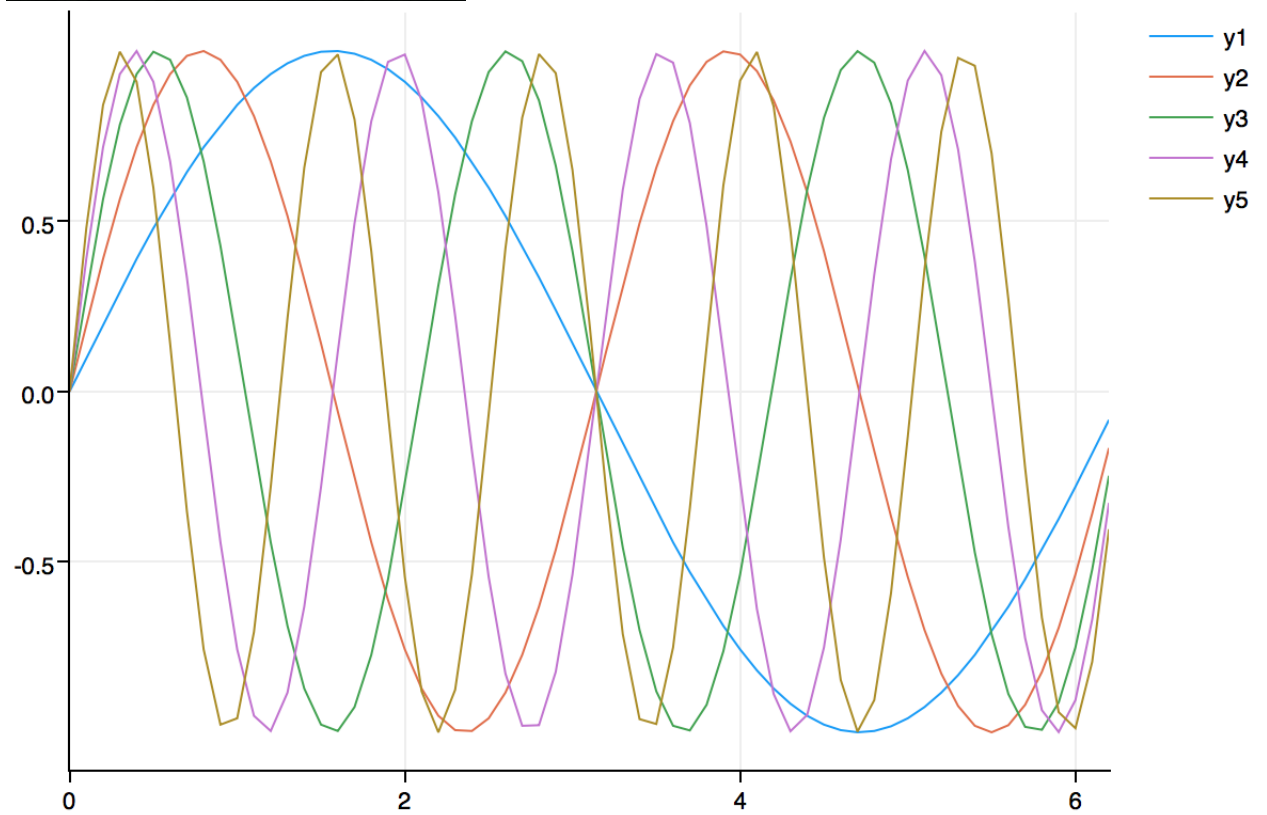
julia> plot!(x, sin(3*x))

julia> plot!(x, sin(4*x))

julia> plot!(x, sin(5*x))

```

2.



```

using Plots
plotly(size=(500,500)) # use plotly for zooming and 500-by-500 for equal
theta = linspace(0, 2*pi, 10000)
r = sqrt(2)
x = 2. + r*cos(theta)
y = 1 + r*sin(theta)
plot(x,y)

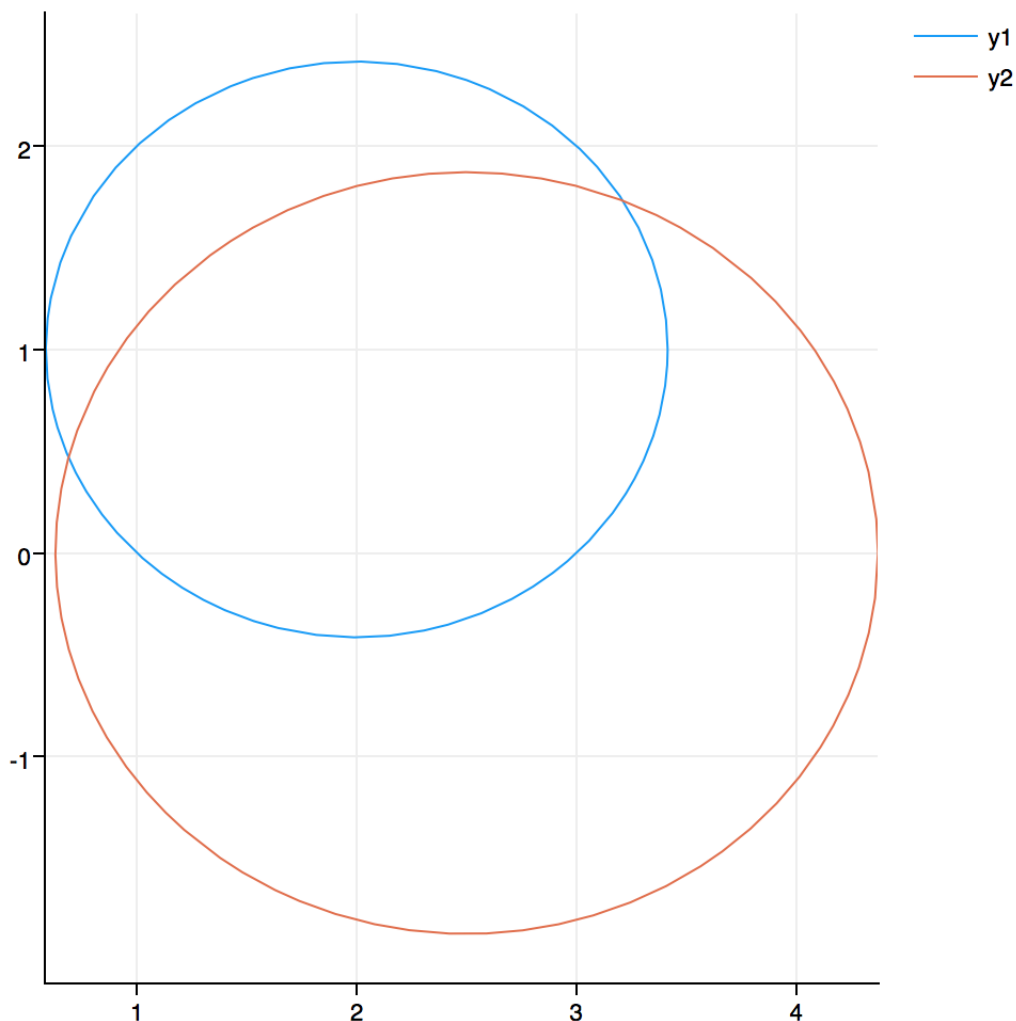
```

```

using Plots
plotly(size=(500,500)) # use plotly for zooming and 500-by-500 for equal
theta = linspace(0, 2*pi, 10000)
r = sqrt(3.5)
x = 2.5 + r*cos(theta)
y = r*sin(theta)
plot!(x,y)

```

3.



Problem 6: Drawing the Julia set (25 points)

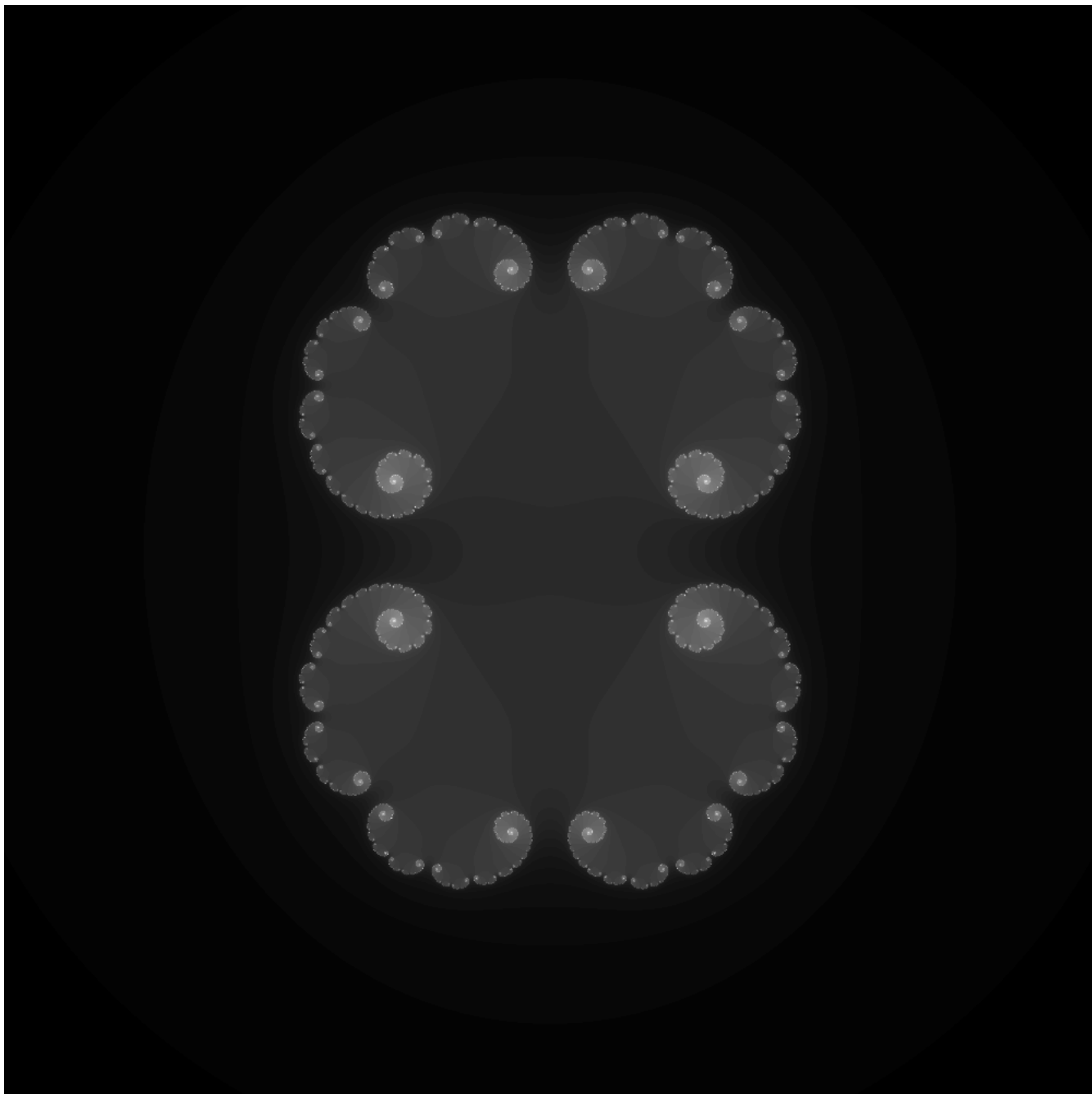
```
10
11
12 function julia_check(z,c)
13
14     k = 0;
15     while k < 256 && abs(z) < 2
16         k = k + 1;
17         z = z * z + c
18     end
19     print(z)
20 end
21
```

2.

```
[juli> include("/Users/tianqiu/Desktop/Purdue/CS314/HW1/6.jl")
julia_check (generic function with 2 methods)

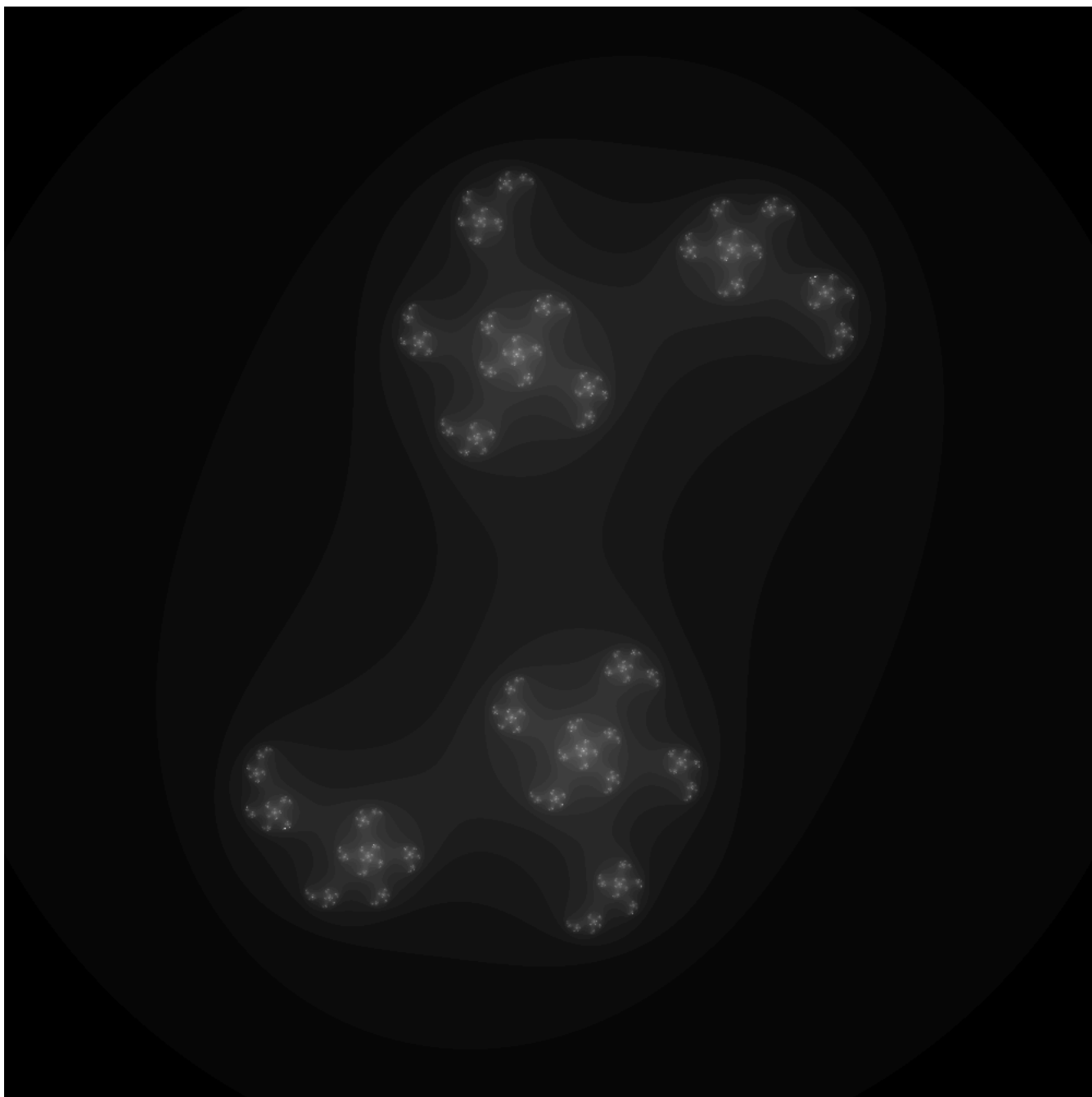
[juli> julia_check(0, 0.5+0.5im)
3.28515625 + 1.34375im
[juli> include("/Users/tianqiu/Desktop/Purdue/CS314/HW1/6.jl")
julia_check (generic function with 2 methods)

[juli> julia_check(-1, 0.5+0.5im)
2.5 + 2.0im
[juli> julia_check(0, 0.5+0.5im)
3.28515625 + 1.34375im
[juli> julia_check(-1, 0.5+0.25im)
2.6875 + 1.0im
[juli> julia_check(0, 0.5+0.25im)
-2.055420018499717 + 0.7100702375173569im
juli>
```



3.

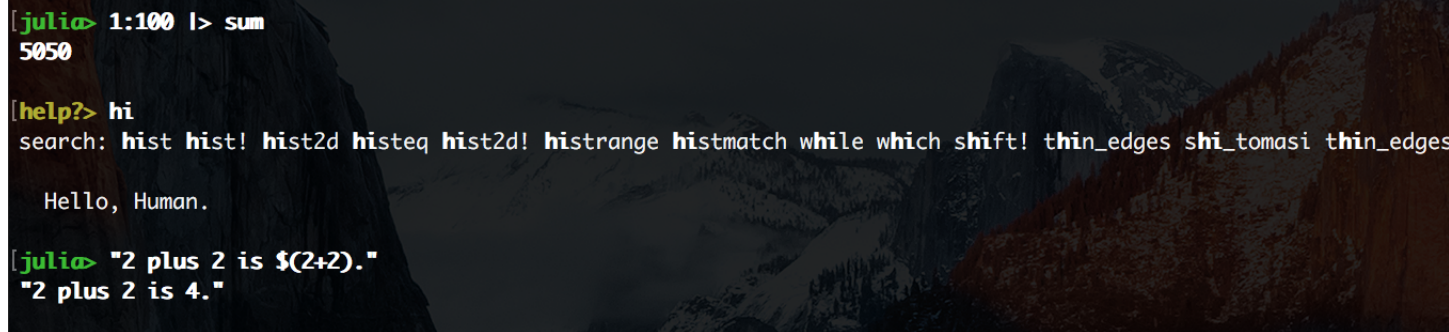
```
[julia> include("/Users/tianqiu/Desktop/Purdue/CS314/HW1/6_3.jl")  
Gray Images.Image with:  
  data: 20x20 Array{Float64,2}  
  properties:  
    colorspace: Gray  
    spatialorder: x y
```



4.
Which one do you like better?

I like the image when $c=0.5+0.5i$, because it is more spiral and more symmetrical, which is more beautiful.

Problem 7: Fun with Julia (5 points)

A screenshot of the Julia REPL interface. The background is a dark, scenic image of a mountain range. The text is displayed in a monospaced font with green prompts. The session shows three commands: a range summation, a help search, and a string interpolation.

```
[julia> 1:100 |> sum
5050

[julia> ? hi
search: hist hist! hist2d histeq hist2d! histrange histmatch while which shift! thin_edges shi_tomasi thin_edges

Hello, Human.

[julia> "2 plus 2 is $(2+2)."
"2 plus 2 is 4."
```

see or hear:

1. sum is the function
2. ? is going into help session
3. \$ sign can add value in string