Getting started with Julia

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December 2019

1 Basic computing

```
1 + 2
```

```
1.0 + 2.0
```

```
2 / 4
```

```
div(2, 4)
```

```
35 \ 7
```

```
1 // 3
```

```
'c'
```

```
:symbol
```

```
Error: type QuoteNode has no field head
```

```
x = 2
```

```
τ = 1 / 37  # fine structure constant
```

```
0.02702702702702703
```

```
3x
```

```
x += 2  # inplace update of x
```

```
4
```

```
mystery = "life, the universe and everything"
```

```
"life, the universe and everything"
```

```
println("The answer to $mystery is $(3*2*7)")
```

```
The answer to life, the universe and everything is 42
```

2 Boolean operators

```julia
# Boolean operators
!true   # => false
!false  # => true
1 == 1  # => true
2 == 1  # => false
1 != 1  # => false
2 != 1  # => true
1 < 10  # => true
1 > 10  # => false
2 <= 2  # => true
2 >= 2  # => true
# Comparisons can be chained
1 < 2 < 3  # => true
2 < 3 < 2  # => false
```

```
false
```

3 Control flow

```julia
if 4 > 3
  println("A")
elseif 3 > 4
  println("B")
else
  println("C")
end
```

```
A
```

```julia
y = condition ? valueiftrue : valueiffalse
```

4 Looping

```julia
characters = ["Harry", "Ron", "Hermione"]

for char in characters
  println("Character $char")
end
```

```
Character Harry
Character Ron
Character Hermione
```

```julia
for (i, char) in enumerate(characters)
  println("$i. $char")
end
```

```
1. Harry
2. Ron
3. Hermione
```

```julia
pets = ["Hedwig", "Pig", "Crookhanks"]

for (char, pet) in zip(characters, pets)
  println("$char has $pet as a pet")
end
```

```
Harry has Hedwig as a pet
Ron has Pig as a pet
Hermione has Crookhanks as a pet
```

```
1675767616
837883808
418941904
209470952
104735476
52367738
26183869
78551608
39275804
19637902
9818951
29456854
14728427
44185282
22092641
66277924
33138962
16569481
49708444
24854222
12427111
37281334
18640667
55922002
27961001
83883004
41941502
20970751
62912254
31456127
94368382
47184191
141552574
70776287
212328862
106164431
318493294
159246647
477739942
238869971
716609914
358304957
1074914872
537457436
268728718
134364359
403093078
201546539
604639618
302319809
906959428
453479714
226739857
680219572
340109786
170054893
```

```
510164680
255082340
127541170
63770585
191311756
95655878
47827939
143483818
71741909
215225728
107612864
53806432
26903216
13451608
6725804
3362902
1681451
5044354
2522177
7566532
3783266
1891633
5674900
2837450
1418725
4256176
2128088
1064044
532022
266011
798034
399017
1197052
598526
299263
897790
448895
1346686
673343
2020030
1010015
3030046
1515023
4545070
2272535
6817606
3408803
10226410
5113205
15339616
7669808
3834904
1917452
958726
479363
1438090
719045
2157136
1078568
```

```
539284
269642
134821
404464
202232
101116
50558
25279
75838
37919
113758
56879
170638
85319
255958
127979
383938
191969
575908
287954
143977
431932
215966
107983
323950
161975
485926
242963
728890
364445
1093336
546668
273334
136667
410002
205001
615004
307502
153751
461254
230627
691882
345941
1037824
518912
259456
129728
64864
32432
16216
8108
4054
2027
6082
3041
9124
4562
2281
6844
```

```
3422
1711
5134
2567
7702
3851
11554
5777
17332
8666
4333
13000
6500
3250
1625
4876
2438
1219
3658
1829
5488
2744
1372
686
343
1030
515
1546
773
2320
1160
580
290
145
436
218
109
328
164
82
41
124
62
31
94
47
142
71
214
107
322
161
484
242
121
364
182
91
274
```

```
137
412
206
103
310
155
466
233
700
350
175
526
263
790
395
1186
593
1780
890
445
1336
668
334
167
502
251
754
377
1132
566
283
850
425
1276
638
319
958
479
1438
719
2158
1079
3238
1619
4858
2429
7288
3644
1822
911
2734
1367
4102
2051
6154
3077
9232
4616
2308
```

```
1154
577
1732
866
433
1300
650
325
976
488
244
122
61
184
92
46
23
70
35
106
53
160
80
40
20
10
5
16
8
4
2
```

5 Functions

```julia
function square(x)
  result = x * x
  return result
end
```

```julia
square(2)
```

```julia
square(2.0)
```

```julia
square("ni")
```

```
"nini"
```

```julia
s(x) = x * x
```

```
s (generic function with 1 method)
```

```julia
s([1, 2, 3, 4, 5])
```

```
s.([1, 2, 3, 4, 5])
```

```julia
safelog(x, offset=0.1; base=10) = log(x + offset) / log(base)
```

```julia
safelog(0)
safelog(0, 0.01)
```

```
safelog(0, 0.01, base=2)
```

```
-6.643856189774724
```

```
?sort
```

```
my_unsorted_list = [4, 5, 9, 7, 1, 9]
```

```
sort(my_unsorted_list)
```

```
my_unsorted_list
```

```
6-element Array{Int64,1}:
 4
 5
 9
 7
 1
 9
```

```
sort!(my_unsorted_list)
```

```
my_unsorted_list
```

```
6-element Array{Int64,1}:
 1
 4
 5
 7
 9
 9
```

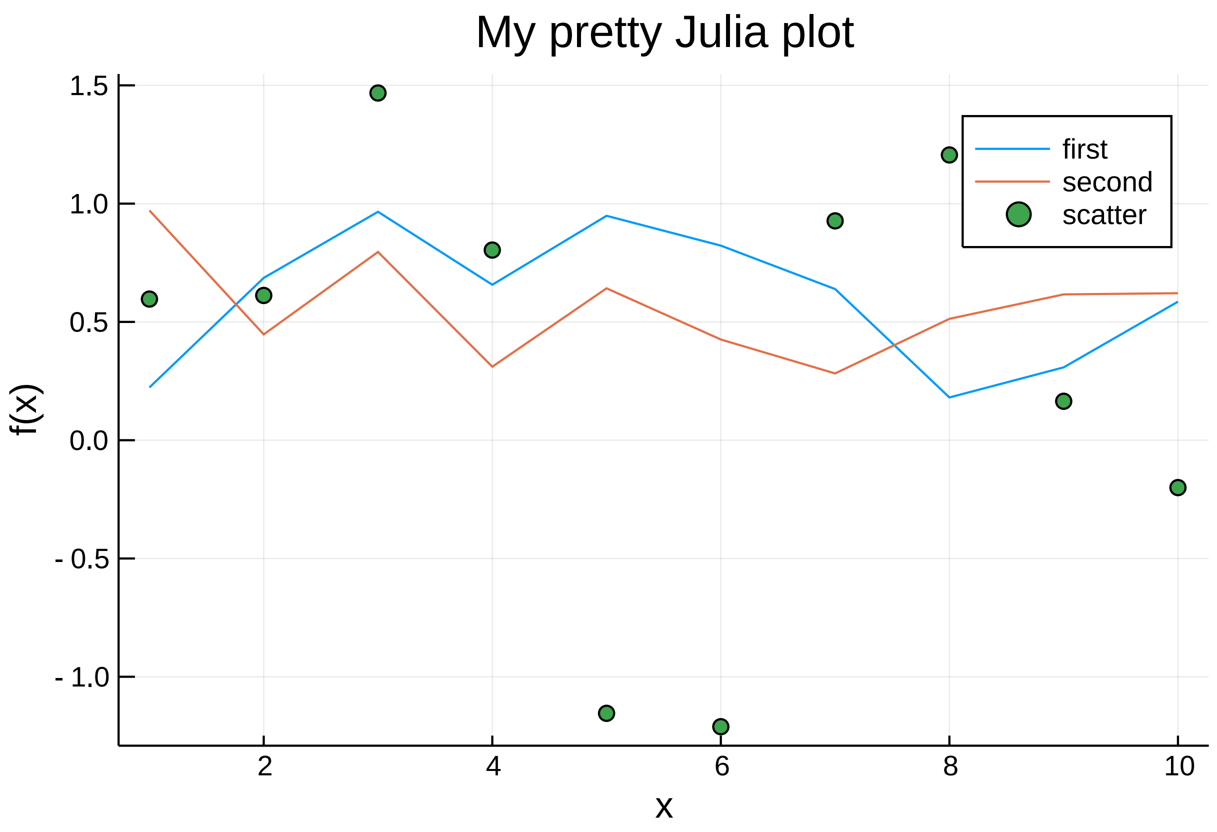
6 Plotting

```
using Plots
```

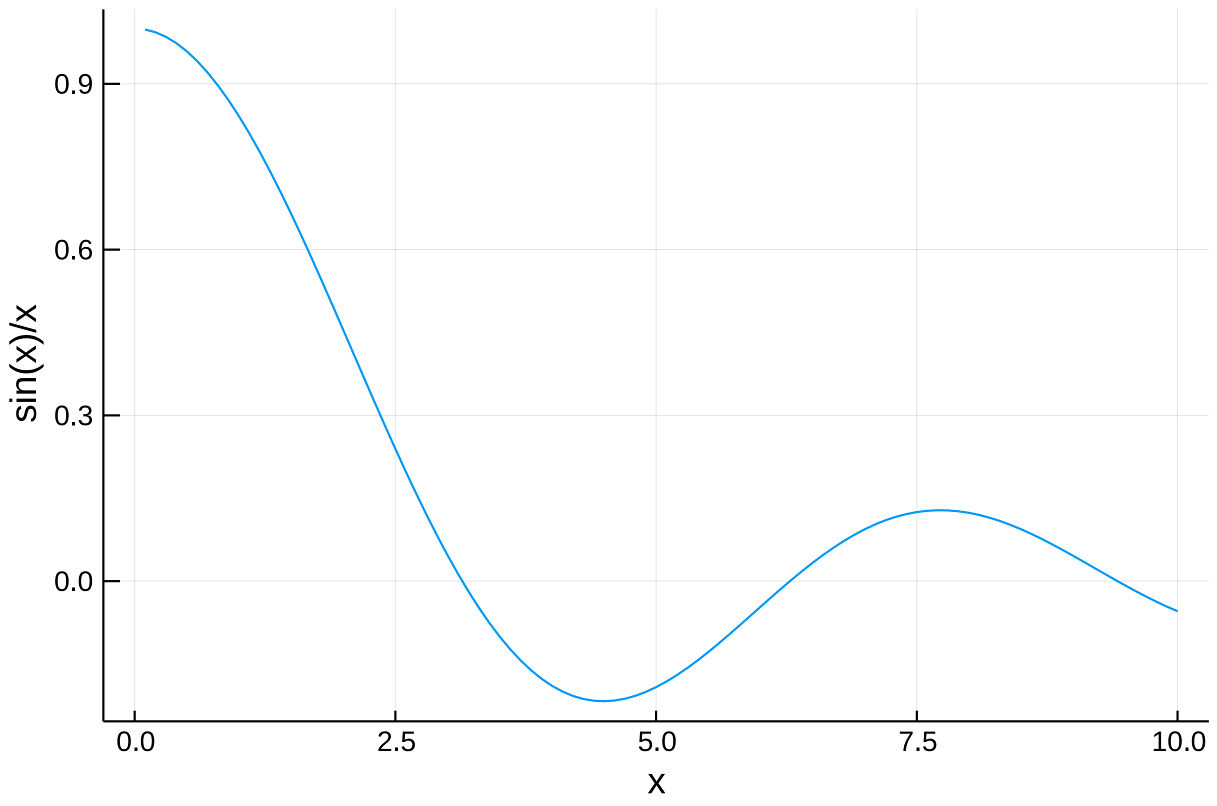
```
plot(1:10, rand(10), label="first")
plot!(1:10, rand(10), label="second")
```

```
scatter!([1:10], randn(10), label="scatter")
```

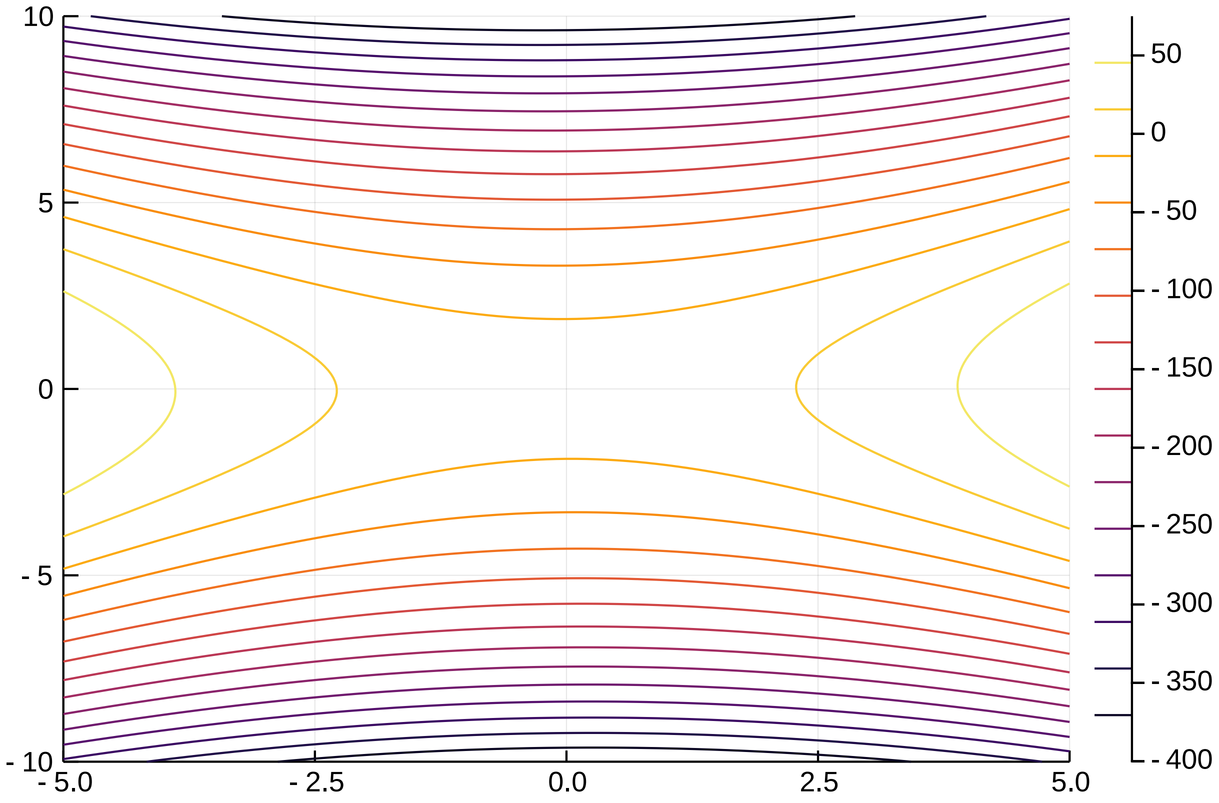
```
xlabel!("x")
ylabel!("f(x)")
title!("My pretty Julia plot")
```



```
plot(0:0.1:10, x -> sin(x) / x, xlabel="x", ylabel="sin(x)/x", legend=:none)
```



```
contour(-5:0.1:5, -10:0.1:10, (x, y) -> 3x^2-4y^2 + x*y/6)
```



7 Exercise