Vectors and Functions

24 January, 2023

Write the R code to answer the following questions. Write the code and then show what the computer returns when that code is run. Make sure to change the appropriate header in the R code block to make this document compile.

You have until the beginning of next class to answer all of the questions below and commit to GitHub. Submit the Rmarkdown and the knitted PDF to Canvas.

Helpful functions here include

- `sin`
- `tan`
- `sqrt`
- `sum`
- `abs`

Some math "reminders"

- $\sum_{i=1}^{10} i$ means "sum of numbers from 1 to 10"
- $\forall i \in [1, 20]$ means "for all integers in the range 1 to 20"

Questions

1. e^2

```
#Code
exp(2)
```

```
## [1] 7.389056
```

2. $((4)^5)^{\frac{1}{8}}$

```
#Code
(4^5)^(1/8)
```

```
## [1] 2.378414
```

3. $sin(\frac{\pi}{3}) \times (1 + tan(\frac{\pi}{3}))$

```
#Code
sin(pi/3)*(1 + tan(pi/3))
```

```
## [1] 2.366025
```

4. $\sqrt{14^3 - 6^{\frac{3}{2}}}$

```
#Code
sqrt(14^3 - 6^(3/2))
```

```
## [1] 52.24273
```

5. $|-ln(2\pi \times (\sqrt{e^9}))|$

```
#Code
abs(-log(2 * pi * sqrt(exp(9)) ))
```

```
## [1] 6.337877
```

6. $\sum_{i=5}^{50} i^{i-1}$

```
#Code
sum((5:50)^(4:49))
```

```
## [1] 1.789933e+83
```

```
# Alternative using for loop
running_sum <- 0
for(i in 5:50){
  running_sum <- running_sum + i^(i-1)
}
running_sum
```

```
## [1] 1.789933e+83
```

7. $\forall i \in [1, 50], \ \sqrt{(i)}$

```
#Code
sqrt(1:50)
```

```
##  [1] 1.000000 1.414214 1.732051 2.000000 2.236068 2.449490 2.645751 2.828427
##  [9] 3.000000 3.162278 3.316625 3.464102 3.605551 3.741657 3.872983 4.000000
## [17] 4.123106 4.242641 4.358899 4.472136 4.582576 4.690416 4.795832 4.898979
## [25] 5.000000 5.099020 5.196152 5.291503 5.385165 5.477226 5.567764 5.656854
## [33] 5.744563 5.830952 5.916080 6.000000 6.082763 6.164414 6.244998 6.324555
## [41] 6.403124 6.480741 6.557439 6.633250 6.708204 6.782330 6.855655 6.928203
## [49] 7.000000 7.071068
```