Assignment 5

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Available at: https://github.com/araujoarthur/metcompA/tree/main/tarefa5

1st Step

Define packages used

In [1]:
```
using DataFrames
using CairoMakie
```

2nd Step

Define position, acceleration and speed functions and the *T* constant

In [2]:
```
position(t,T) = -25 * (t + T*e^(-t/T)) + 325 # e is a built-in variable i
acceleration(t,T) = -e^(-t/T)/T
speed(t,T) = -25 * (1 - e^(-t/T))
T = 5
```

Out[2]:
```
5
```

3rd Step

Build and show the dataframe

In [3]:
```
data = DataFrame(TIME=0:0.5:10)
data.POSITION = position.(data.TIME, T)
data.ACCELERATION = acceleration.(data.TIME, T)
data.SPEED = speed.(data.TIME, T)
data
```

Out[3]: 21 rows × 4 columns

	TIME	POSITION	ACCELERATION	SPEED
	Float64	Float64	Float64	Float64
1	0.0	200.0	-0.2	-0.0
2	0.5	199.395	-0.180967	-2.37906
3	1.0	197.659	-0.163746	-4.53173
4	1.5	194.898	-0.148164	-6.47954
5	2.0	191.21	-0.134064	-8.242
6	2.5	186.684	-0.121306	-9.83673
7	3.0	181.399	-0.109762	-11.2797
8	3.5	175.427	-0.0993171	-12.5854
9	4.0	168.834	-0.0898658	-13.7668
10	4.5	161.679	-0.0813139	-14.8358
11	5.0	154.015	-0.0735759	-15.803
12	5.5	145.891	-0.0665742	-16.6782
13	6.0	137.351	-0.0602388	-17.4701
14	6.5	128.434	-0.0545064	-18.1867
15	7.0	119.175	-0.0493194	-18.8351
16	7.5	109.609	-0.044626	-19.4217
17	8.0	99.7629	-0.0403793	-19.9526
18	8.5	89.6646	-0.0365367	-20.4329
19	9.0	79.3376	-0.0330598	-20.8675
20	9.5	68.8039	-0.0299137	-21.2608
21	10.0	58.0831	-0.0270671	-21.6166

4th Step

Build graphics

Building raw data graphics:

In [4]:
```
graphTotal = Figure(backgroundcolor=:white, resolution=(700,500))
graphAcTem = Axis(graphTotal[1,1], title="Acceleration x Time", ylabel="A
graphSpTem = Axis(graphTotal[1,2], title="Speed x Time", ylabel="Speed (m
graphPosTem = Axis(graphTotal[2,1:2], title="Position x Time", ylabel="Po
lines!(graphAcTem, data.TIME, data.ACCELERATION)
lines!(graphSpTem, data.TIME, data.SPEED, color=:red)
lines!(graphPosTem, data.TIME, data.POSITION)
```

Out[4]:
```
Lines{Tuple{Vector{Point{2, Float32}}}}
```

Building ascending acceleration and speed graphs

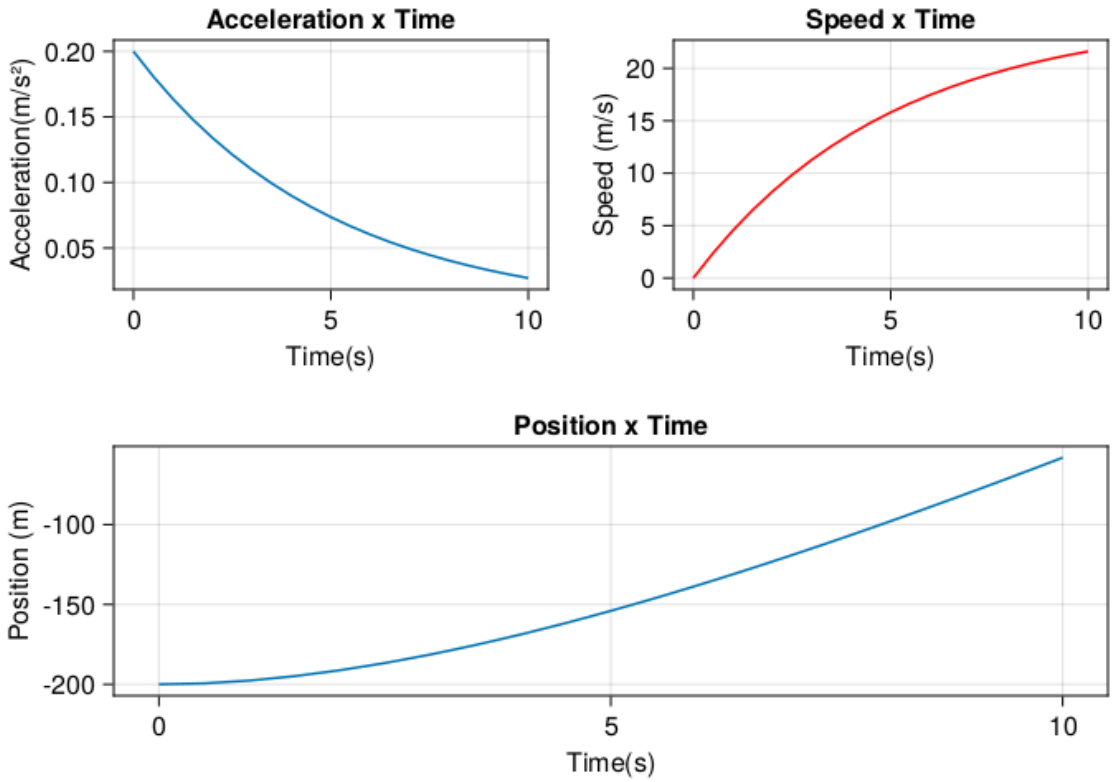
In [5]:
```
graphTotalPositive = graphTotal = Figure(backgroundcolor=:white, resoluti
graphAcTem = Axis(graphTotal[1,1], title="Acceleration x Time", ylabel="A
graphSpTem = Axis(graphTotal[1,2], title="Speed x Time", ylabel="Speed (m
graphPosTem = Axis(graphTotal[2,1:2], title="Position x Time", ylabel="Po
lines!(graphAcTem, data.TIME, -data.ACCELERATION)
lines!(graphSpTem, data.TIME, -data.SPEED, color=:red)
lines!(graphPosTem, data.TIME, -data.POSITION)
```

Out[5]:
```
Lines{Tuple{Vector{Point{2, Float32}}}}
```

Graphics

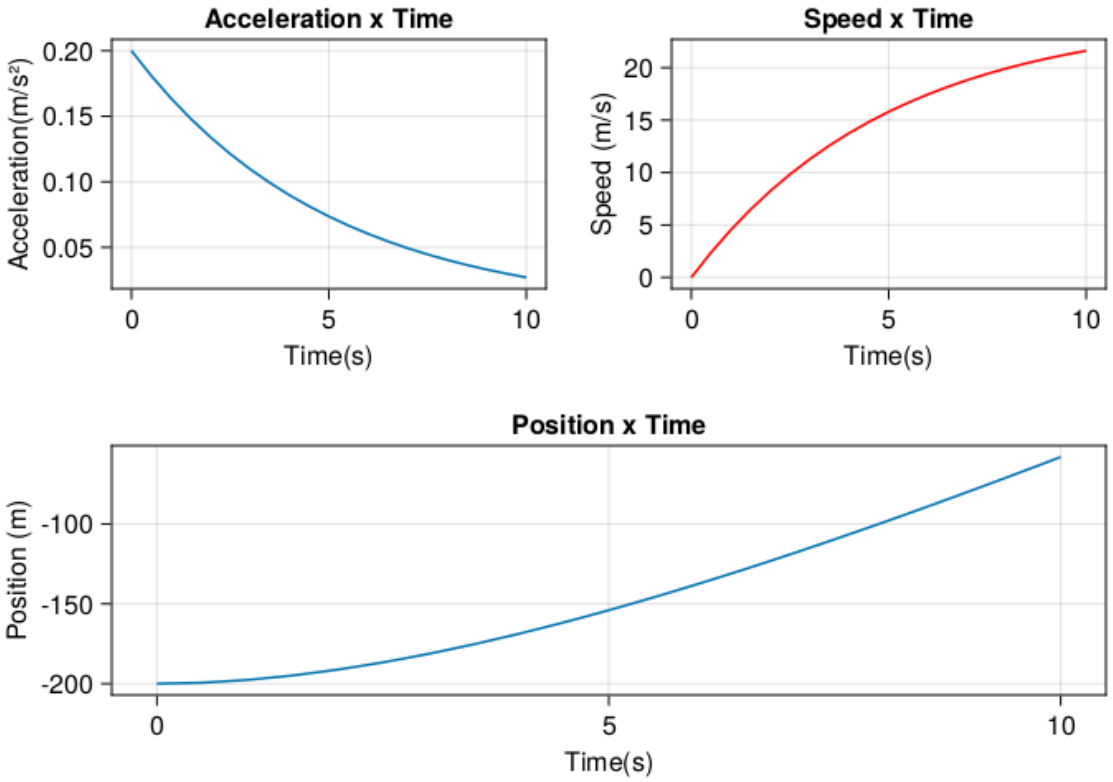
In [6]:
```
graphTotal
```

Out[6]:



In [7]:
```
graphTotalPositive
```

Out[7]:


Acceleration x Time
Acceleration(m/s²)
0.20
0.15
0.10
0.05
0
5
10
Time(s)
Speed x Time
Speed (m/s)
20
15
10
5
0
0
5
10
Time(s)
Position x Time
Position (m)
-100
-150
-200
0
5
10
Time(s)

In [ ]: