

# THIS IS NOT A SOLUTION PER SAY BUT A GUIDE OF WHAT RESULTS LOOK LIKE

## Exercise 1

2022-2023/FOE/Programming/Part 2 (Optimization)/Workshop

3/Workshop\_3\_2\_SOLUTION.py:34: DtypeWarning: Columns

(6,7,9,10,11,12,13,14,19,20,21,22,23,24,25,26,27,28,31,32,34,35) have mixed types. Specify dtype option on import or set low\_memory=False.

```
df_original= pd.read_csv("flight_csv.csv")
```

```
Time (secs) [3d Latitude] ... PRES POSN LAT WIND DIRECTION TRUE.1
0    0.00    0.000000 ...      NaN      NaN
1    0.25    0.000000 ...      NaN      NaN
2    0.50    0.000000 ...      NaN      NaN
3    0.75    0.000000 ...      NaN      NaN
4    1.00    52.303928 ...      NaN      NaN
```

[5 rows x 39 columns]

```
Time (secs) [3d Latitude] ... [3d Heading] WIND DIRECTION TRUE.1
count 35237.000000 3.523700e+04 ... 35237.000000      0.0
mean  4404.500000 9.656951e+33 ... 217.957945      NaN
std   2543.047514 1.812757e+36 ... 74.819087      NaN
min    0.000000 0.000000e+00 ... -82.300000      NaN
25%   2202.250000 4.145737e+01 ... 178.900000      NaN
50%   4404.500000 4.551291e+01 ... 208.400000      NaN
75%   6606.750000 5.013959e+01 ... 245.000000      NaN
max   8809.000000 3.402820e+38 ... 360.800000      NaN
```

[8 rows x 7 columns]

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## Exercise 2

here

```
Time (secs) [3d Latitude] ... [3d Heading] WIND DIRECTION TRUE.1
count 35237.000000 3.523700e+04 ... 35237.000000      0.0
mean  4404.500000 9.656951e+33 ... 217.957945      NaN
std   2543.047514 1.812757e+36 ... 74.819087      NaN
min    0.000000 0.000000e+00 ... -82.300000      NaN
25%   2202.250000 4.145737e+01 ... 178.900000      NaN
50%   4404.500000 4.551291e+01 ... 208.400000      NaN
75%   6606.750000 5.013959e+01 ... 245.000000      NaN
max   8809.000000 3.402820e+38 ... 360.800000      NaN
```

[8 rows x 7 columns]

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### Exercise 3

	LAT	LON	ALT
0	0.000000	0.000000	-4.0
1	0.000000	0.000000	-4.0
2	0.000000	0.000000	-4.0
3	0.000000	0.000000	-4.0
4	52.303928	4.765694	-4.0
5	52.303928	4.765694	-4.0
6	52.303928	4.765694	-4.0
7	52.303928	4.765694	-4.0
8	52.303928	4.765694	-4.0
9	52.303928	4.765694	-4.0

	LAT	LON	ALT
35227	0.0	0.0	21.0
35228	0.0	0.0	21.0
35229	0.0	0.0	21.0
35230	0.0	0.0	21.0
35231	0.0	0.0	21.0
35232	0.0	0.0	21.0
35233	0.0	0.0	21.0
35234	0.0	0.0	21.0
35235	0.0	0.0	21.0
35236	0.0	0.0	21.0

	LAT	LON	ALT
count	3.523700e+04	35237.000000	35237.000000
mean	9.656951e+33	2.746451	20529.886043
std	1.812757e+36	1.336038	17393.092188
min	0.000000e+00	0.000000	-4.000000
25%	4.145737e+01	2.292324	21.000000
50%	4.551291e+01	2.732148	23136.700000
75%	5.013959e+01	3.431822	39034.100000
max	3.402820e+38	4.847054	39198.400000

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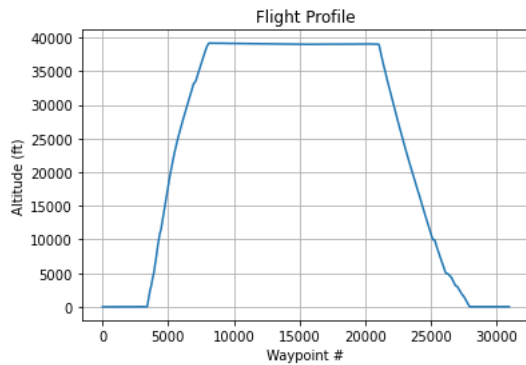
### Exercise 4

	LAT	LON	ALT
count	2.838500e+04	28385.000000	28385.000000
mean	1.198809e+34	3.181338	25480.994451
std	2.019736e+36	0.895914	15794.995697
min	4.129765e+01	2.076619	-4.000000
25%	4.330185e+01	2.540731	8820.000000
50%	4.716603e+01	2.839568	35015.400000
75%	5.076448e+01	3.931060	39048.300000
max	3.402820e+38	4.847054	39198.400000

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### Exercise 5



### Exercise 6

	LAT	LON	ALT
count	2.838500e+04	28385.000000	28385.000000
mean	1.198809e+34	3.181338	25480.994451
std	2.019736e+36	0.895914	15794.995697
min	4.129765e+01	2.076619	-4.000000
25%	4.330185e+01	2.540731	8820.000000
50%	4.716603e+01	2.839568	35015.400000
75%	5.076448e+01	3.931060	39048.300000
max	3.402820e+38	4.847054	39198.400000

	LAT	LON	ALT
count	24595.000000	24595.000000	24595.000000
mean	46.599525	3.029872	29407.311954
std	3.573140	0.755850	13132.628288
min	41.302181	2.093549	-4.000000
25%	43.235042	2.533355	19880.850000
50%	46.569187	2.808749	39011.600000
75%	49.793711	3.151647	39053.900000
max	52.421459	4.847054	39198.400000

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### Exercise 7

	LAT	LON	ALT
count	13001.000000	13001.000000	13001.000000
mean	47.164365	2.728988	39069.316199
std	2.002986	0.331658	50.663770
min	43.648235	2.248789	39000.600000
25%	45.421745	2.479933	39026.700000
50%	47.203060	2.703036	39052.200000
75%	48.926701	2.847229	39110.700000
max	50.505951	3.734560	39198.400000

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### Exercise 8

	LAT	LON	ALT
count	13001.000000	13001.000000	13001.000000
mean	47.164365	2.728988	39069.316199

std	2.002986	0.331658	50.663770
min	43.648235	2.248789	39000.600000
25%	45.421745	2.479933	39026.700000
50%	47.203060	2.703036	39052.200000
75%	48.926701	2.847229	39110.700000
max	50.505951	3.734560	39198.400000

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## Exercise 9

1.1168894469992665

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## Exercise 10

0.0009501360000285786

