Chapter 3 - Exercise 5: Tính median của chiều cao (height) dựa vào vị trí (position)

Các kiến thức sử dụng trong bài tập:

Các xử lý trên mảng

1. Lọc các giá trị của mảng theo điều kiện
2. Tính toán thông kê trên mảng

Cho 2 tập tin heights.txt và positions.txt => chép dữ liệu từ 2 tập tin vào 2 list là heights và positions, sau đó thực hiện các yêu cầu, và đối chiếu với kết quả được cung cấp:

'GK' (goalkeeper), 'M' (midfield), 'A' (attack) and 'D' (defense).

```
import numpy as np
heights = [191, 184, 185, 180, 181, 187, 170, 179, 183, 186, 185, 170, 187, 183, 173, 188,
193, 183, 184, 178, 180, 177, 188, 177, 187, 186, 183, 189, 179, 196, 190, 189, 188, 188,
179, 180, 174, 183, 178, 187, 178, 193, 181, 180, 187, 179, 173, 175, 188, 187, 175, 171,
175, 174, 179, 177, 187, 184, 185, 175, 193, 185, 191, 181, 183, 176, 176, 182, 192, 187,
190, 190, 192, 185, 178, 182, 171, 182, 173, 192, 175, 183, 183, 184, 176, 183, 186, 178,
187, 190, 180, 194, 182, 182, 183, 178, 183, 171, 185, 177, 180, 195, 173, 185, 186, 187,
183, 180, 185, 184, 181, 186, 185, 182, 175, 173, 175, 176, 174, 184, 177, 185, 162, 180,
178, 176, 175, 177, 191, 183, 189, 173, 180, 180, 185, 185, 180, 181, 183, 180, 185, 175,
183, 184, 188, 170, 182, 183, 170, 186, 191, 187, 188, 177, 180, 182, 174, 183, 178, 182,
183, 181, 175, 187, 178, 182, 182, 183, 184, 170, 178, 175, 186, 175, 178, 185, 178, 190,
175, 175, 185, 193, 172, 179, 180, 179, 186, 180, 176, 190, 175, 175, 186, 196, 186, 187,
174, 168, 185, 160, 191, 185, 186, 179, 188, 185, 189, 183, 183, 176, 183, 180, 171, 187,
174, 174, 186, 193, 191, 180, 181, 177, 195, 190, 185, 168, 183, 175, 191, 184, 182, 188,
175, 180, 178, 181, 188, 175, 180, 183, 191, 183, 180, 182, 178, 189, 183, 183, 178, 170,
200, 176, 184, 189, 181, 185, 184, 191, 191, 184, 190, 190, 170, 183, 183, 169, 183, 185,
193, 185, 175, 182, 182, 180, 185, 180, 188, 175, 183, 185, 185, 176, 189, 186, 181, 181,
190, 177, 184, 191, 173, 178, 180, 185, 183, 186, 175, 189, 189, 189, 189, 183, 166, 178,
180, 182, 184, 181, 177, 178, 180, 183, 194, 185, 191, 180, 187, 181, 183, 183, 180, 185,
178, 193, 175, 190, 186, 186, 180, 186, 183, 177, 180, 175, 184, 184, 178, 166, 183, 186,
180, 170, 180, 188, 180, 178, 196, 192, 186, 175, 184, 175, 171, 187, 170, 183, 184, 178,
189, 188, 174, 173, 172, 179, 171, 176, 173, 185, 183, 187, 178, 176, 187, 171, 185, 174,
184, 179, 184, 185, 181, 170, 176, 191, 173, 183, 178, 189, 183, 187, 202, 180, 183, 186,
180, 188, 191, 178, 178, 175, 183, 191, 183, 182, 187, 181, 175, 186, 175, 189, 180, 188,
179, 186, 170, 178, 184, 191, 187, 174, 178, 186, 184, 193, 188, 185, 188, 173, 175, 195,
193, 173, 180, 172, 176, 191, 187, 184, 184, 199, 175, 191, 190, 183, 192, 191, 189, 174,
173, 180, 180, 175, 173, 185, 185, 189, 176, 173, 183, 175, 179, 193, 188, 183, 183, 175,
186, 176, 173, 171, 179, 173, 192, 182, 180, 191, 182, 192, 185, 192, 186, 179, 178, 186,
186, 174, 191, 180, 188, 183, 183, 184, 180, 175, 188, 181, 188, 186, 188, 175, 188, 178,
180, 187, 186, 180, 190, 188, 183, 174, 193, 178, 184, 170, 166, 176, 168, 200, 180, 183,
```

180, 187, 186, 180, 190, 188, 182, 174, 193, 178, 184, 170, 166, 176, 168, 200, 180, 182,
178, 177, 178, 172, 169, 191, 175, 176, 178, 183, 181, 175, 191, 181, 177, 170, 180, 184,
174, 190, 191, 188, 180, 185, 183, 194, 183, 178, 180, 183, 171, 178, 184, 190, 185, 185,
192, 189, 183, 180, 178, 194, 178, 180, 185, 183, 184, 181, 184, 170, 183, 179, 179, 172,
184, 164, 170, 179, 179, 173, 178, 182, 187, 179, 175, 191, 180, 180, 183, 172, 187, 179,
173, 180, 190, 185, 183, 167, 191, 185, 185, 182, 178, 183, 183, 184, 189, 182, 186, 178,
188, 185, 199, 186, 174, 170, 189, 186, 176, 178, 188, 175, 178, 173, 177, 189, 178, 183,
182, 189, 177, 183, 185, 183, 178, 185, 177, 175, 172, 181, 170, 179, 170, 164, 166, 176,
189, 176, 185, 177, 172, 177, 188, 178, 185, 181, 175, 181, 183, 175, 177, 180, 181, 174,
182, 188, 175, 176, 184, 187, 193, 175, 185, 181, 186, 182, 180, 178, 182, 175, 184, 184,
182, 185, 177, 177, 180, 175, 188, 174, 177, 179, 171, 170, 185, 186, 168, 180, 185, 176,
196, 177, 175, 179, 187, 181, 175, 174, 178, 192, 178, 183, 182, 167, 187, 185, 179, 166,
177, 172, 178, 184, 193, 185, 187, 190, 188, 189, 177, 180, 175, 180, 178, 185, 194, 188,
189, 190, 185, 182, 191, 178, 187, 175, 193, 178, 182, 179, 178, 187, 174, 179, 191, 170,
187, 186, 196, 186, 175, 194, 184, 193, 192, 172, 179, 190, 183, 192, 182, 184, 183, 186,
175, 176, 175, 191, 190, 174, 184, 180, 181, 184, 177, 183, 174, 180, 175, 179, 179, 177,
181, 180, 186, 188, 189, 193, 190, 185, 189, 191, 187, 182, 192, 181, 170, 183, 176, 188,
182, 186, 174, 179, 187, 185, 177, 188, 192, 183, 172, 191, 184, 168, 186, 177, 180, 199,
196, 182, 185, 184, 180, 179, 178, 185, 178, 184, 173, 171, 172, 185, 184, 178, 180, 175,
188, 171, 183, 185, 196, 185, 170, 183, 183, 170, 173, 180, 180, 188, 185, 178, 173, 185,
184, 180, 177, 187, 178, 180, 179, 189, 192, 187, 186, 185, 193, 179, 185, 190, 182, 185,
182, 191, 175, 177, 184, 185, 185, 198, 180, 188, 176, 185, 193, 173, 173, 185, 191, 188,
170, 183, 186, 185, 178, 189, 189, 181, 175, 172, 187, 185, 175, 180, 178, 191, 180, 188,
180, 178, 183, 184, 193, 175, 174, 175, 188, 183, 185, 178, 188, 175, 172, 185, 186, 186,
186, 185, 172, 175, 172, 172, 182, 174, 188, 190, 194, 168, 185, 188, 183, 185, 185, 178,
180, 184, 186, 183, 186, 183, 174, 178, 181, 183, 185, 174, 184, 192, 181, 174, 186, 191,
173, 181, 184, 186, 191, 179, 181, 183, 181, 196, 184, 186, 184, 181, 188, 180, 186, 180,
198, 178, 178, 185, 180, 182, 182, 185, 173, 180, 185, 191, 175, 180, 174, 183, 183, 181,
190, 192, 183, 190, 181, 170, 189, 186, 188, 178, 186, 180, 175, 180, 163, 182, 177, 183,
175, 185, 185, 178, 165, 163, 180, 178, 180, 175, 179, 176, 183, 186, 180, 187, 171, 170,
178, 185, 179, 181, 193, 186, 175, 175, 191, 190, 175, 172, 176, 189, 184, 166, 180, 183,
185, 173, 183, 180, 172, 178, 183, 180, 180, 187, 178, 179, 187, 179, 181, 182, 182, 187,
180, 172, 196, 175, 185, 178, 175, 186, 178, 185, 188, 182, 188, 183, 189, 185, 193, 190,
185, 178, 169, 184, 193, 173, 185, 177, 178, 185, 186, 183, 182, 183, 178, 183, 165, 178,
189, 184, 176, 180, 172, 189, 174, 185, 190, 186, 177, 183, 180, 178, 191, 185, 178, 189,
184, 187, 184, 190, 185, 190, 187, 180, 184, 171, 196, 185, 176, 186, 193, 173, 178, 183,
177, 187, 174, 184, 179, 188, 190, 190, 176, 187, 173, 180, 168, 170, 188, 184, 180, 185,
186, 178, 186, 191, 176, 178, 183, 184, 175, 181, 165, 173, 171, 180, 178, 175, 185, 180,
166, 185, 185, 180, 197, 181, 188, 181, 178, 183, 176, 185, 178, 190, 178, 196, 188, 187,
187, 187, 185, 187, 173, 188, 176, 170, 185, 184, 173, 185, 180, 187, 180, 190, 180, 183,
185, 183, 188, 177, 178, 192, 182, 195, 183, 180, 177, 180, 178, 178, 182, 188, 182, 188,
183, 171, 184, 188, 185, 175, 191, 185, 183, 173, 180, 191, 183, 186, 180, 183, 193, 176,
192, 185, 175, 180, 183, 182, 173, 196, 180, 188, 185, 194, 172, 175, 178, 182, 193, 188,
184, 187, 173, 185, 173, 193, 188, 183, 185, 174, 183, 175, 180, 186, 180, 185, 178, 188,
180, 188, 180, 180, 185, 185, 173, 180, 183, 174, 186, 183, 180, 188, 176, 184, 180, 188,
178, 174, 180, 175, 170, 180, 183, 185, 180, 185, 179, 183, 185, 193, 188, 175, 190, 180,
175, 175, 173, 185, 173, 185, 188, 188, 185, 180, 173, 183, 181, 174, 187, 179, 194, 183,
180, 171, 188, 180, 186, 185, 178, 188, 187, 180, 175, 170, 183, 179, 186, 191, 172, 193,
191, 193, 183, 178, 167, 178, 183, 173, 180, 163, 188, 181, 188, 188, 188, 184, 191, 178,
178, 185, 183, 178, 178, 183, 188, 183, 183, 180, 168, 183, 183, 191, 183, 185, 182, 185,
176, 180, 192, 184, 183, 173, 189, 190, 187, 179, 171, 185, 178, 189, 175, 181, 196, 176,
174, 176, 182, 183, 181, 177, 176, 187, 180, 182, 168, 180, 183, 173, 185, 178, 172, 178,
190, 175, 183, 179, 175, 188, 176, 180, 188, 180, 190, 180, 175, 191, 196, 185, 175, 167,
181, 177, 186, 176, 193, 175, 189, 180, 170, 184, 169, 178, 173, 186, 192, 173, 184, 185,
185, 175, 185, 190, 185, 188, 185, 188, 182, 176, 193, 180, 182, 183, 184, 185, 187, 185,
182, 176, 175, 176, 180, 180, 185, 177, 185, 167, 178, 184, 183, 181, 190, 184, 180, 180

182, 176, 175, 176, 180, 180, 183, 177, 183, 167, 178, 184, 183, 181, 190, 184, 180, 180,
188, 185, 180, 192, 182, 178, 185, 173, 180, 178, 170, 193, 178, 176, 181, 178, 180, 178,
191, 180, 185, 189, 180, 186, 182, 188, 191, 195, 186, 191, 186, 177, 179, 185, 179, 192,
183, 175, 185, 184, 176, 180, 186, 185, 172, 186, 173, 184, 191, 196, 188, 188, 182, 186,
188, 178, 182, 175, 170, 181, 186, 170, 169, 177, 180, 183, 178, 177, 172, 175, 189, 180,
173, 178, 174, 182, 176, 186, 178, 175, 174, 180, 185, 185, 177, 183, 187, 185, 183, 185,
173, 191, 183, 174, 180, 178, 185, 185, 184, 184, 198, 178, 175, 180, 180, 175, 178, 183,
176, 188, 193, 175, 185, 180, 193, 191, 173, 175, 175, 181, 184, 176, 175, 185, 173, 193,
188, 175, 185, 185, 178, 191, 185, 178, 178, 183, 175, 175, 185, 186, 181, 185, 191, 186,
172, 178, 173, 185, 187, 188, 174, 179, 185, 185, 175, 183, 178, 161, 172, 179, 187, 177,
175, 181, 178, 185, 183, 170, 187, 182, 182, 185, 184, 189, 188, 178, 196, 186, 183, 179,
173, 173, 171, 169, 177, 178, 190, 181, 182, 180, 180, 190, 189, 181, 177, 183, 191, 181,
183, 178, 178, 173, 186, 169, 188, 191, 198, 190, 178, 183, 178, 183, 179, 183, 187, 181,
169, 188, 168, 180, 179, 182, 180, 181, 171, 178, 176, 186, 178, 180, 178, 191, 186, 183,
182, 188, 178, 170, 185, 190, 190, 187, 183, 176, 176, 181, 185, 173, 184, 176, 180, 177,
183, 181, 188, 185, 180, 170, 188, 186, 178, 180, 175, 182, 176, 189, 183, 174, 182, 192,
190, 170, 181, 186, 180, 178, 178, 183, 180, 175, 183, 180, 181, 181, 180, 187, 185, 188,
192, 193, 182, 175, 165, 188, 182, 165, 172, 172, 185, 178, 183, 180, 187, 183, 193, 191,
168, 183, 187, 183, 188, 175, 180, 175, 183, 184, 180, 188, 180, 188, 183, 178, 193, 180,
177, 176, 180, 184, 178, 184, 176, 172, 178, 175, 170, 175, 187, 171, 175, 181, 180, 178,
196, 187, 185, 178, 173, 185, 178, 188, 192, 179, 177, 177, 185, 186, 188, 186, 182, 169,
183, 180, 190, 185, 185, 175, 184, 175, 178, 188, 178, 195, 192, 184, 184, 181, 185, 177,
185, 190, 171, 182, 175, 180, 185, 180, 180, 185, 177, 168, 168, 190, 175, 188, 182, 178,
179, 184, 173, 174, 178, 185, 182, 169, 183, 192, 180, 179, 180, 183, 181, 168, 185, 182,
181, 168, 181, 180, 193, 188, 172, 187, 180, 191, 175, 182, 172, 186, 186, 184, 174, 189,
183, 172, 174, 175, 187, 178, 189, 194, 170, 188, 179, 194, 187, 183, 183, 191, 170, 183,
184, 189, 168, 183, 178, 180, 180, 176, 174, 189, 179, 183, 186, 183, 173, 175, 183, 173,
175, 173, 184, 166, 181, 192, 174, 178, 178, 189, 184, 193, 183, 186, 191, 180, 183, 180,
190, 180, 182, 180, 183, 185, 191, 189, 178, 188, 180, 183, 173, 174, 173, 169, 178, 173,
183, 174, 172, 172, 187, 172, 180, 182, 193, 199, 192, 192, 167, 184, 185, 190, 184, 183,
182, 178, 188, 187, 182, 183, 191, 179, 190, 169, 186, 172, 186, 186, 185, 192, 186, 193,
190, 185, 180, 182, 183, 184, 190, 186, 176, 182, 182, 170, 186, 168, 178, 183, 198, 189,
181, 182, 185, 183, 184, 182, 188, 185, 184, 192, 191, 183, 173, 163, 183, 170, 180, 186,
180, 178, 190, 180, 180, 191, 176, 180, 170, 181, 180, 189, 188, 180, 196, 202, 195, 180,
184, 168, 192, 177, 177, 184, 175, 180, 179, 182, 184, 173, 180, 180, 178, 174, 186, 184,
185, 176, 184, 189, 180, 194, 177, 168, 184, 174, 188, 180, 184, 184, 188, 180, 185, 180,
174, 186, 183, 183, 177, 183, 183, 180, 180, 172, 189, 180, 178, 180, 180, 183, 187, 182,
192, 183, 193, 181, 175, 185, 178, 194, 187, 178, 188, 170, 170, 180, 184, 185, 175, 180,
175, 175, 184, 170, 180, 176, 187, 193, 184, 183, 189, 191, 178, 185, 180, 180, 191, 183,
171, 183, 187, 188, 176, 169, 174, 191, 177, 168, 184, 183, 191, 191, 179, 170, 177, 191,
186, 195, 186, 181, 186, 185, 182, 175, 180, 174, 180, 180, 185, 185, 173, 178, 174, 193,
185, 193, 185, 181, 185, 183, 183, 175, 181, 172, 181, 178, 172, 184, 188, 186, 175, 178,
188, 187, 186, 173, 177, 187, 179, 188, 170, 178, 185, 175, 191, 185, 183, 173, 175, 182,
177, 183, 183, 176, 180, 183, 185, 172, 186, 177, 188, 168, 190, 188, 176, 195, 178, 181,
187, 183, 191, 188, 175, 192, 181, 183, 180, 185, 182, 185, 188, 184, 182, 191, 183, 190,
186, 194, 184, 181, 187, 181, 180, 181, 184, 191, 180, 175, 185, 168, 176, 180, 173, 176,
180, 180, 188, 175, 185, 190, 183, 183, 173, 180, 188, 183, 193, 178, 177, 187, 179, 184,
194, 180, 183, 175, 186, 184, 180, 183, 181, 173, 183, 190, 190, 182, 188, 173, 183, 190,
190, 183, 186, 184, 182, 180, 173, 182, 184, 178, 188, 182, 178, 184, 193, 186, 186, 191,
180, 173, 170, 188, 185, 190, 179, 193, 178, 182, 180, 190, 189, 183, 181, 186, 188, 189,
192, 184, 180, 175, 184, 173, 177, 182, 187, 192, 185, 170, 180, 171, 174, 183, 186, 188,
170, 182, 181, 160, 176, 178, 163, 179, 174, 191, 176, 171, 180, 173, 190, 193, 186, 183,
176, 180, 194, 196, 170, 186, 175, 186, 180, 192, 169, 179, 183, 175, 183, 173, 190, 191,
181, 180, 175, 193, 186, 184, 175, 180, 171, 188, 180, 178, 171, 192, 194, 180, 183, 175,
187, 181, 164, 178, 190, 183, 191, 172, 188, 190, 183, 180, 186, 186, 183, 178, 170, 179,
178, 178, 183, 183, 183, 188, 194, 182, 174, 185, 175, 185, 193, 182, 187, 180, 175, 182,

179, 178, 183, 185, 185, 188, 194, 182, 174, 185, 175, 185, 193, 182, 187, 180, 175, 182,
178, 188, 170, 185, 187, 175, 175, 184, 176, 183, 185, 187, 174, 175, 190, 173, 187, 186,
180, 194, 182, 180, 182, 177, 178, 187, 184, 190, 185, 175, 175, 178, 184, 188, 184, 180,
185, 183, 188, 189, 181, 184, 178, 187, 187, 184, 173, 186, 168, 184, 181, 175, 185, 175,
180, 183, 184, 191, 171, 183, 178, 178, 177, 183, 178, 174, 175, 178, 185, 175, 172, 185,
185, 187, 182, 189, 190, 174, 170, 179, 174, 191, 179, 173, 172, 188, 188, 198, 172, 175,
185, 191, 185, 181, 178, 180, 182, 183, 177, 185, 175, 175, 185, 185, 183, 191, 184, 187,
188, 179, 185, 186, 186, 174, 179, 180, 179, 170, 186, 186, 189, 191, 182, 196, 185, 175,
193, 185, 178, 177, 174, 188, 193, 183, 183, 180, 186, 180, 185, 183, 168, 187, 191, 172,
176, 180, 180, 191, 185, 186, 180, 172, 170, 185, 187, 184, 190, 180, 180, 183, 174, 177,
193, 183, 176, 185, 188, 182, 177, 183, 191, 185, 183, 189, 177, 183, 194, 176, 171, 179,
176, 183, 187, 183, 184, 183, 190, 190, 181, 182, 181, 171, 183, 177, 178, 180, 180, 172,
183, 168, 182, 190, 188, 180, 177, 182, 180, 195, 196, 176, 182, 196, 174, 173, 182, 176,
187, 181, 188, 172, 172, 179, 182, 180, 181, 175, 169, 199, 180, 173, 181, 192, 177, 178,
182, 194, 177, 180, 183, 168, 186, 173, 197, 182, 179, 183, 194, 176, 181, 165, 186, 180,
183, 178, 185, 185, 180, 183, 182, 185, 183, 178, 184, 183, 181, 168, 185, 190, 165, 188,
172, 183, 193, 178, 183, 186, 186, 176, 187, 181, 179, 183, 179, 179, 186, 178, 183, 184,
185, 186, 186, 178, 190, 202, 183, 174, 166, 176, 178, 186, 189, 180, 176, 168, 175, 174,
176, 193, 180, 183, 187, 184, 170, 190, 173, 183, 175, 187, 182, 185, 178, 188, 170, 183,
171, 189, 187, 186, 179, 180, 181, 174, 183, 188, 178, 177, 183, 190, 180, 180, 175, 178,
189, 188, 180, 186, 177, 186, 172, 183, 185, 178, 173, 187, 180, 177, 173, 172, 185, 177,
180, 182, 177, 170, 173, 187, 178, 181, 187, 190, 186, 187, 187, 169, 185, 196, 188, 180,
180, 177, 176, 178, 190, 183, 183, 177, 188, 190, 186, 196, 186, 187, 192, 186, 180, 179,
175, 180, 175, 181, 181, 193, 175, 185, 175, 180, 177, 178, 172, 179, 174, 180, 176, 170,
180, 184, 175, 176, 198, 190, 179, 181, 177, 178, 185, 187, 185, 180, 171, 188, 177, 176,
183, 184, 173, 177, 176, 174, 178, 183, 192, 174, 191, 173, 173, 180, 174, 174, 176, 188,
186, 180, 178, 170, 186, 191, 174, 177, 183, 182, 183, 185, 180, 185, 175, 172, 184, 177,
173, 180, 180, 185, 191, 179, 176, 182, 180, 175, 180, 180, 180, 181, 179, 182, 178, 183,
173, 185, 177, 175, 180, 193, 179, 178, 180, 177, 183, 193, 192, 180, 175, 195, 184, 180,
193, 180, 180, 173, 186, 193, 173, 180, 170, 188, 180, 177, 186, 176, 178, 175, 190, 188,
184, 174, 188, 185, 184, 186, 191, 185, 178, 182, 186, 185, 185, 178, 193, 183, 182, 185,
178, 185, 190, 183, 172, 181, 192, 190, 182, 185, 188, 181, 185, 168, 180, 176, 180, 174,
182, 187, 178, 184, 173, 188, 184, 175, 170, 186, 184, 189, 195, 182, 175, 175, 186, 174,
170, 185, 173, 188, 185, 173, 179, 177, 183, 178, 182, 185, 197, 191, 173, 171, 183, 181,
176, 176, 183, 188, 175, 183, 182, 186, 180, 183, 192, 185, 168, 184, 174, 176, 184, 186,
186, 175, 191, 173, 173, 176, 185, 176, 175, 183, 175, 189, 184, 181, 183, 175, 184, 190,
194, 180, 184, 185, 180, 187, 194, 173, 187, 173, 180, 185, 190, 179, 178, 194, 186, 180,
185, 175, 178, 176, 175, 172, 187, 190, 167, 193, 183, 173, 183, 175, 196, 180, 172, 187,
174, 181, 194, 176, 184, 187, 183, 183, 184, 180, 191, 178, 172, 174, 185, 178, 185, 172,
188, 180, 187, 175, 176, 179, 189, 177, 181, 177, 179, 193, 196, 187, 183, 179, 183, 182,
192, 177, 181, 182, 189, 184, 183, 169, 173, 197, 182, 178, 181, 185, 185, 173, 175, 181,
172, 171, 173, 186, 178, 178, 190, 175, 178, 179, 185, 191, 172, 179, 178, 172, 184, 183,
178, 178, 193, 173, 188, 176, 178, 173, 178, 185, 178, 178, 175, 180, 169, 192, 181, 176,
176, 175, 179, 177, 175, 180, 185, 191, 181, 171, 188, 188, 196, 187, 185, 192, 169, 190,
180, 191, 188, 181, 177, 173, 170, 184, 185, 175, 194, 180, 174, 180, 190, 191, 170, 182,
191, 191, 170, 190, 185, 183, 186, 176, 181, 188, 170, 178, 178, 188, 188, 183, 175, 175,
191, 176, 177, 178, 181, 183, 173, 188, 173, 180, 191, 175, 185, 175, 188, 193, 176, 186,
185, 172, 183, 188, 181, 184, 188, 183, 171, 184, 183, 193, 188, 168, 183, 181, 178, 182,
178, 178, 171, 182, 180, 193, 180, 178, 177, 175, 183, 193, 188, 180, 185, 190, 193, 190,
183, 181, 177, 177, 190, 180, 185, 186, 187, 196, 189, 173, 185, 183, 175, 188, 193, 180,
182, 188, 167, 188, 185, 187, 184, 183, 180, 191, 183, 175, 182, 191, 178, 172, 185, 180,
179, 189, 178, 182, 189, 184, 186, 178, 192, 184, 175, 187, 185, 180, 177, 185, 183, 185,
178, 178, 185, 185, 194, 185, 191, 193, 173, 185, 180, 178, 185, 188, 186, 180, 180, 180,
185, 180, 179, 190, 180, 183, 192, 189, 178, 178, 174, 170, 176, 170, 195, 178, 187, 178,
175, 184, 184, 179, 174, 189, 176, 184, 180, 182, 188, 180, 173, 186, 179, 188, 184, 180,
179, 180, 193, 179, 185, 178, 179, 183, 168, 183, 184, 180, 203, 173, 180, 170, 193, 175,

179, 180, 193, 179, 185, 178, 179, 185, 188, 185, 184, 180, 203, 175, 180, 170, 193, 179,
193, 175, 177, 184, 185, 189, 179, 182, 173, 165, 184, 191, 175, 185, 187, 170, 184, 178,
180, 192, 188, 172, 168, 177, 165, 194, 174, 181, 177, 174, 180, 177, 191, 179, 194, 185,
182, 176, 172, 171, 190, 175, 178, 190, 180, 191, 179, 187, 189, 180, 188, 178, 187, 181,
189, 191, 183, 192, 181, 180, 178, 181, 191, 182, 178, 173, 192, 188, 180, 175, 187, 187,
185, 185, 195, 178, 180, 180, 182, 179, 172, 187, 181, 165, 177, 198, 180, 179, 174, 180,
180, 174, 175, 175, 178, 181, 193, 173, 185, 170, 190, 189, 182, 180, 180, 175, 180, 179,
178, 170, 183, 185, 190, 179, 191, 173, 182, 191, 171, 186, 173, 175, 183, 187, 180, 178,
189, 185, 180, 180, 178, 176, 175, 180, 183, 170, 178, 180, 184, 181, 178, 180, 177, 178,
179, 181, 180, 176, 162, 179, 193, 185, 176, 178, 183, 177, 182, 177, 182, 174, 175, 180,
185, 172, 174, 181, 186, 189, 175, 178, 193, 180, 174, 182, 180, 193, 180, 181, 173, 188,
180, 180, 190, 184, 188, 188, 188, 183, 179, 182, 176, 178, 173, 185, 185, 189, 178, 188,
178, 175, 183, 170, 179, 186, 188, 186, 175, 179, 177, 186, 176, 173, 183, 178, 178, 186,
174, 177, 188, 180, 182, 186, 187, 186, 180, 184, 190, 165, 193, 189, 180, 175, 188, 180,
183, 186, 186, 173, 180, 188, 175, 181, 179, 183, 186, 173, 168, 184, 183, 178, 193, 178,
174, 182, 178, 183, 178, 183, 193, 188, 175, 196, 175, 185, 185, 183, 185, 183, 180, 165,
191, 185, 187, 178, 176, 184, 185, 177, 175, 170, 175, 181, 194, 186, 175, 174, 176, 188,
179, 178, 180, 178, 175, 181, 170, 182, 184, 182, 180, 175, 178, 168, 175, 188, 183, 184,
191, 178, 180, 180, 180, 175, 182, 185, 191, 175, 185, 183, 176, 173, 182, 183, 179, 192,
194, 187, 175, 191, 186, 178, 178, 191, 185, 180, 173, 179, 170, 183, 196, 180, 193, 188,
188, 174, 187, 177, 179, 170, 181, 186, 176, 180, 177, 190, 185, 180, 179, 189, 185, 175,
178, 182, 174, 180, 188, 175, 189, 180, 188, 183, 191, 172, 183, 189, 179, 188, 171, 180,
180, 176, 180, 186, 170, 169, 180, 179, 178, 180, 186, 178, 180, 178, 185, 178, 188, 193,
182, 183, 171, 171, 180, 178, 178, 176, 174, 187, 180, 187, 175, 188, 184, 194, 175, 173,
181, 180, 185, 178, 185, 185, 192, 187, 185, 185, 180, 182, 185, 180, 177, 190, 179, 190,
180, 193, 193, 193, 180, 181, 193, 175, 171, 183, 178, 183, 184, 178, 180, 180, 180, 180,
193, 181, 185, 193, 183, 192, 175, 171, 190, 169, 181, 188, 187, 188, 183, 182, 179, 178,
184, 181, 187, 174, 178, 183, 184, 180, 185, 185, 199, 173, 180, 180, 172, 183, 175, 175,
185, 171, 188, 183, 187, 188, 175, 186, 188, 188, 165, 184, 180, 191, 194, 182, 169, 191,
182, 173, 180, 175, 190, 183, 180, 195, 175, 182, 186, 172, 189, 170, 182, 185, 182, 170,
182, 193, 177, 176, 178, 180, 170, 190, 183, 178, 185, 177, 180, 180, 190, 185, 193, 180,
186, 175, 185, 179, 178, 181, 182, 188, 176, 182, 175, 188, 188, 178, 196, 173, 180, 190,
181, 189, 185, 178, 175, 183, 188, 186, 173, 191, 185, 195, 184, 175, 198, 185, 185, 170,
188, 177, 181, 183, 191, 195, 178, 194, 182, 174, 187, 182, 183, 193, 182, 185, 183, 176,
187, 178, 170, 180, 181, 192, 173, 183, 183, 180, 185, 183, 175, 183, 187, 171, 182, 185,
187, 185, 183, 180, 186, 171, 189, 191, 184, 186, 189, 180, 180, 192, 188, 176, 190, 183,
193, 184, 194, 180, 182, 186, 183, 166, 177, 190, 185, 187, 190, 178, 196, 190, 182, 183,
185, 179, 186, 184, 167, 184, 174, 184, 179, 185, 185, 180, 190, 191, 185, 185, 180, 191,
169, 184, 196, 183, 190, 189, 194, 186, 170, 175, 180, 181, 187, 184, 187, 166, 185, 183,
175, 188, 185, 188, 183, 182, 180, 194, 186, 187, 173, 190, 182, 185, 187, 180, 177, 180,
180, 183, 171, 180, 180, 191, 178, 178, 188, 180, 175, 169, 191, 180, 188, 173, 188, 191,
181, 193, 172, 175, 194, 178, 189, 184, 185, 185, 177, 163, 190, 175, 201, 191, 184, 193,
173, 186, 184, 193, 175, 175, 185, 179, 175, 182, 178, 175, 187, 173, 180, 180, 185, 178,
182, 187, 188, 175, 168, 185, 182, 174, 190, 179, 181, 183, 185, 180, 185, 178, 188, 182,
177, 181, 175, 175, 185, 191, 188, 181, 186, 194, 191, 179, 188, 193, 185, 178, 185, 191,
185, 185, 175, 191, 180, 184, 190, 188, 185, 188, 170, 180, 177, 188, 196, 168, 183, 191,
185, 191, 179, 180, 173, 183, 173, 181, 185, 192, 191, 198, 185, 183, 178, 191, 185, 174,
178, 183, 191, 178, 174, 189, 174, 193, 180, 178, 189, 175, 185, 180, 185, 177, 173, 186,
173, 180, 180, 178, 182, 183, 185, 180, 175, 178, 193, 183, 185, 183, 178, 180, 187, 178,
188, 192, 183, 185, 173, 196, 182, 176, 181, 185, 188, 185, 183, 184, 188, 173, 186, 178,
181, 182, 181, 185, 168, 184, 191, 184, 183, 194, 190, 189, 181, 177, 190, 179, 186, 178,
180, 182, 173, 177, 192, 183, 175, 182, 178, 188, 192, 183, 186, 188, 180, 191, 180, 173,
177, 178, 171, 188, 173, 179, 182, 183, 185, 165, 182, 194, 181, 176, 180, 172, 187, 178,

```python
positions = ['GK', 'M', 'A', 'D', 'M', 'D', 'M', 'M', 'M', 'A', 'M', 'M', 'A', 'A', 'A', '

# Câu 1:
# a) Tạo numpy array np_positions từ list positions
np_positions=np.array(positions,dtype='U5')

# In danh sách các phần tử của np_positions
print(np_positions)
# Xem kiểu dữ liệu (type) của np_positions
print(type(np_positions))

print('')

# b) Tạo numpy array np_heights từ list heights
np_heights=np.array(heights,dtype='float')

# In danh sách các phần tử của np_heights
print(np_heights)

# Xem kiểu dữ liệu (type) của np_heights
print(type(np_heights))
```

```
['GK' 'M' 'A' ... 'D' 'D' 'M']
<class 'numpy.ndarray'>

[191. 184. 185. ... 183. 179. 179.]
<class 'numpy.ndarray'>
```

▶ Nhấn vào đây để xem kết quả !

```python
# Câu 2: Tính chiều cao trung bình của các GK (Goal Keeper).
GK_heights=np_heights[np_positions=='GK']
np.median(GK_heights)
```

```
188.0
```

```python
# Câu 3: Tính chiều cao trung bình của những vị trí khác (Không phải là Goal Keeper).
other_heights=np_heights[np_positions!='GK']
np.median(other_heights)
```

```
181.0
```

```python
# Câu 4: Tạo mảng dữ liệu có cấu trúc tự định nghĩa players gồm 'position' kiểu văn bản (U

dt=np.dtype([('position','U5'),('height','float')])
arr_players=np.empty([len(np_positions)],dtype=dt)
```

```
arr_players['position']=np_positions
arr_players['height']=np_heights

print(arr_players)
```

```
    [('GK', 191.) ('M', 184.) ('A', 185.) ... ('D', 183.) ('D', 179.)
     ('M', 179.)]
```

```
# Câu 5: Sắp mảng players theo height, cho biết vị trí có chiều cao cao nhất và chiều cao
print('Mảng players theo chiều cao: ',np.sort(arr_players,order='height'))
print('Chiều cao cao nhất:',max(arr_players['height']))
print('Chiều cao thấp nhất: ',min(arr_players['height']))
```

```
    Mảng players theo chiều cao:  [('M', 158.) ('A', 160.) ('M', 160.) ... ('A', 203.) (
     ('GK', 208.)]
    Chiều cao cao nhất: 208.0
    Chiều cao thấp nhất:  158.0
```

```
import pandas as pd
df = pd.DataFrame(arr_players)
df.head()
```

	position	height
0	GK	191.0
1	M	184.0
2	A	185.0
3	D	180.0
4	M	181.0

```
df['height'].min()
```

```
    158.0
```

```
df.loc[df['height']==df['height'].min()]
```

	position	height
3367	M	158.0

```
a = np.array(np_positions,dtype='<U5')
print (a)
b = np.array(np_heights,dtype=float)
print (b)
players = np.vstack((a,b)).T
players[0]
```

```
['GK' 'M' 'A' ... 'D' 'D' 'M']
[191. 184. 185. ... 183. 179. 179.]
array(['GK', '191.0'], dtype='<U32')
```