第三題b(ii)

In [1]:

```
import matplotlib.pyplot as plt
```

Δt = 300s

In [2]:

```
temp = [[85, 85, 85, 85, 20]]


for p in range (1,91):
    newtemp = list()
    newtemp.append(round(0.5*(2*temp[p-1][1]),1))
    for i in range(1,4):
        #print(i)
        newtemp.append(round(0.5*(temp[p-1][i-1]+temp[p-1][i+1]),1))
    newtemp.append(20)
    temp.append(newtemp)

    """
    diff = 0
    for i in range(5):
        if abs(temp[p][i]-temp[p-1][i]) >= 0.01:
            continue
        else:
            diff += 1

    if(diff != 5):
        break
    """


p = 0
for i in temp:
    print(p,i)
    p += 1
```

```
0 [85, 85, 85, 85, 20]
1 [85.0, 85.0, 85.0, 52.5, 20]
2 [85.0, 85.0, 68.8, 52.5, 20]
3 [85.0, 76.9, 68.8, 44.4, 20]
4 [76.9, 76.9, 60.7, 44.4, 20]
5 [76.9, 68.8, 60.7, 40.4, 20]
6 [68.8, 68.8, 54.6, 40.4, 20]
7 [68.8, 61.7, 54.6, 37.3, 20]
8 [61.7, 61.7, 49.5, 37.3, 20]
9 [61.7, 55.6, 49.5, 34.8, 20]
10 [55.6, 55.6, 45.2, 34.8, 20]
11 [55.6, 50.4, 45.2, 32.6, 20]
12 [50.4, 50.4, 41.5, 32.6, 20]
13 [50.4, 46.0, 41.5, 30.8, 20]
14 [46.0, 46.0, 38.4, 30.8, 20]
15 [46.0, 42.2, 38.4, 29.2, 20]
16 [42.2, 42.2, 35.7, 29.2, 20]
17 [42.2, 39.0, 35.7, 27.9, 20]
18 [39.0, 39.0, 33.5, 27.9, 20]
19 [39.0, 36.2, 33.5, 26.8, 20]
20 [36.2, 36.2, 31.5, 26.8, 20]
21 [36.2, 33.9, 31.5, 25.8, 20]
22 [33.9, 33.9, 29.9, 25.8, 20]
23 [33.9, 31.9, 29.9, 24.9, 20]
24 [31.9, 31.9, 28.4, 24.9, 20]
25 [31.9, 30.1, 28.4, 24.2, 20]
26 [30.1, 30.1, 27.1, 24.2, 20]
27 [30.1, 28.6, 27.1, 23.6, 20]
28 [28.6, 28.6, 26.1, 23.6, 20]
29 [28.6, 27.4, 26.1, 23.1, 20]
30 [27.4, 27.4, 25.2, 23.1, 20]
31 [27.4, 26.3, 25.2, 22.6, 20]
32 [26.3, 26.3, 24.5, 22.6, 20]
33 [26.3, 25.4, 24.5, 22.2, 20]
34 [25.4, 25.4, 23.8, 22.2, 20]
35 [25.4, 24.6, 23.8, 21.9, 20]
36 [24.6, 24.6, 23.2, 21.9, 20]
37 [24.6, 23.9, 23.2, 21.6, 20]
38 [23.9, 23.9, 22.8, 21.6, 20]
39 [23.9, 23.4, 22.8, 21.4, 20]
40 [23.4, 23.4, 22.4, 21.4, 20]
41 [23.4, 22.9, 22.4, 21.2, 20]
42 [22.9, 22.9, 22.0, 21.2, 20]
43 [22.9, 22.4, 22.0, 21.0, 20]
44 [22.4, 22.4, 21.7, 21.0, 20]
45 [22.4, 22.0, 21.7, 20.9, 20]
46 [22.0, 22.0, 21.4, 20.9, 20]
47 [22.0, 21.7, 21.4, 20.7, 20]
48 [21.7, 21.7, 21.2, 20.7, 20]
49 [21.7, 21.4, 21.2, 20.6, 20]
50 [21.4, 21.4, 21.0, 20.6, 20]
51 [21.4, 21.2, 21.0, 20.5, 20]
52 [21.2, 21.2, 20.9, 20.5, 20]
53 [21.2, 21.0, 20.9, 20.4, 20]
54 [21.0, 21.0, 20.7, 20.4, 20]
55 [21.0, 20.9, 20.7, 20.4, 20]
56 [20.9, 20.9, 20.6, 20.4, 20]
57 [20.9, 20.8, 20.6, 20.3, 20]
58 [20.8, 20.8, 20.6, 20.3, 20]
59 [20.8, 20.7, 20.6, 20.3, 20]
60 [20.7, 20.7, 20.5, 20.3, 20]
61 [20.7, 20.6, 20.5, 20.2, 20]
62 [20.6, 20.6, 20.4, 20.2, 20]
63 [20.6, 20.5, 20.4, 20.2, 20]
64 [20.5, 20.5, 20.4, 20.2, 20]
65 [20.5, 20.4, 20.4, 20.2, 20]
66 [20.4, 20.4, 20.3, 20.2, 20]
67 [20.4, 20.4, 20.3, 20.1, 20]
68 [20.4, 20.4, 20.2, 20.1, 20]
69 [20.4, 20.3, 20.2, 20.1, 20]
70 [20.3, 20.3, 20.2, 20.1, 20]
71 [20.3, 20.2, 20.2, 20.1, 20]
72 [20.2, 20.2, 20.1, 20.1, 20]
73 [20.2, 20.1, 20.1, 20.1, 20]
74 [20.1, 20.1, 20.1, 20.1, 20]
75 [20.1, 20.1, 20.1, 20.1, 20]
76 [20.1, 20.1, 20.1, 20.1, 20]
77 [20.1, 20.1, 20.1, 20.1, 20]
78 [20.1, 20.1, 20.1, 20.1, 20]
79 [20.1, 20.1, 20.1, 20.1, 20]
80 [20.1, 20.1, 20.1, 20.1, 20]
81 [20.1, 20.1, 20.1, 20.1, 20]
82 [20.1, 20.1, 20.1, 20.1, 20]
83 [20.1, 20.1, 20.1, 20.1, 20]
84 [20.1, 20.1, 20.1, 20.1, 20]
85 [20.1, 20.1, 20.1, 20.1, 20]
86 [20.1, 20.1, 20.1, 20.1, 20]
87 [20.1, 20.1, 20.1, 20.1, 20]
88 [20.1, 20.1, 20.1, 20.1, 20]
89 [20.1, 20.1, 20.1, 20.1, 20]
90 [20.1, 20.1, 20.1, 20.1, 20]
```

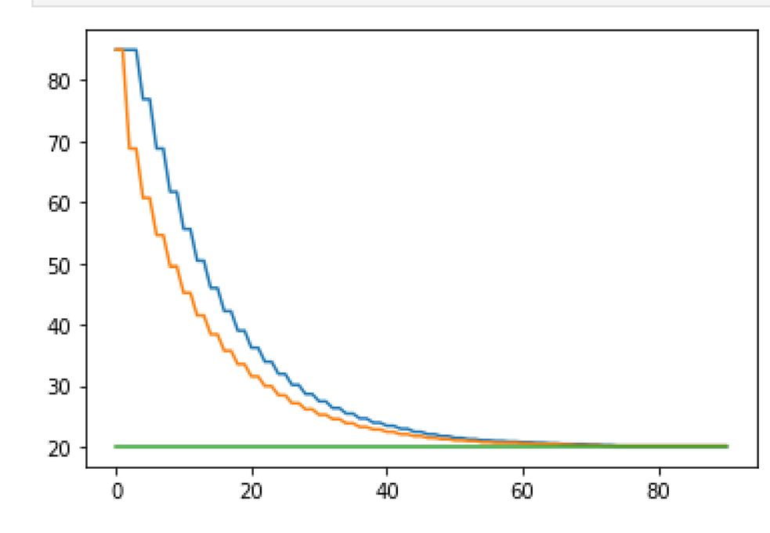
Δt = 300s

In [3]:

```
left = []
mid = []
right = []
for i in range(len(temp)):
    left.append(temp[i][0])
    mid.append(temp[i][2])
    right.append(temp[i][4])

plt.plot(left)
plt.plot(mid)
plt.plot(right)

plt.show()
```



In [8]:

```
temp = [[85, 85, 85, 85, 20]]

fo = 0.125

def calc2(fo,temp):
    for p in range (1,200):
        newtemp = list()
        newtemp.append(round(fo*(2*temp[p-1][1])+(1-2*fo)*temp[p-1][1],1))
        for i in range(1,4):
            #print(i)
            newtemp.append(round(fo*(temp[p-1][i-1]+temp[p-1][i+1])+(1-2*fo)*temp[p-1][i],1))
        newtemp.append(20)
        temp.append(newtemp)

        """
        diff = 0
        for i in range(5):
            if (temp[p-1][i]-temp[p][i]) < 1:
                diff += 1

        if diff == 5:
            return temp
        """
    return temp

temp = calc2(fo,temp)

p = 0
for i in range(len(temp)):
    print(p,temp[i])
    p += 1
```

```
0 [85, 85, 85, 85, 20]
1 [85.0, 85.0, 85.0, 76.9, 20]
2 [85.0, 85.0, 84.0, 70.8, 20]
3 [85.0, 84.9, 82.5, 66.1, 20]
4 [84.9, 84.6, 80.8, 62.4, 20]
5 [84.6, 84.2, 79.0, 59.4, 20]
6 [84.2, 83.6, 77.2, 56.9, 20]
7 [83.6, 82.9, 75.5, 54.8, 20]
8 [82.9, 82.1, 73.8, 53.0, 20]
9 [82.1, 81.2, 72.2, 51.5, 20]
10 [81.2, 80.2, 70.7, 50.1, 20]
11 [80.2, 79.1, 69.3, 48.9, 20]
12 [79.1, 78.0, 68.0, 47.8, 20]
13 [78.0, 76.9, 66.7, 46.8, 20]
14 [76.9, 75.8, 65.5, 45.9, 20]
15 [75.8, 74.6, 64.3, 45.1, 20]
16 [74.6, 73.5, 63.2, 44.4, 20]
17 [73.5, 72.3, 62.1, 43.7, 20]
18 [72.3, 71.2, 61.1, 43.0, 20]
19 [71.2, 70.1, 60.1, 42.4, 20]
20 [70.1, 69.0, 59.1, 41.8, 20]
21 [69.0, 67.9, 58.2, 41.2, 20]
22 [67.9, 66.8, 57.3, 40.7, 20]
23 [66.8, 65.8, 56.4, 40.2, 20]
24 [65.8, 64.8, 55.5, 39.7, 20]
25 [64.8, 63.8, 54.7, 39.2, 20]
26 [63.8, 62.8, 53.9, 38.7, 20]
27 [62.8, 61.8, 53.1, 38.3, 20]
28 [61.8, 60.8, 52.3, 37.9, 20]
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31 [59.0, 58.1, 50.2, 36.7, 20]
32 [58.1, 57.2, 49.5, 36.3, 20]
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36 [54.7, 53.9, 46.9, 34.8, 20]
37 [53.9, 53.1, 46.3, 34.5, 20]
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39 [52.4, 51.6, 45.1, 33.9, 20]
40 [51.6, 50.9, 44.5, 33.6, 20]
41 [50.9, 50.2, 43.9, 33.3, 20]
42 [50.2, 49.5, 43.4, 33.0, 20]
43 [49.5, 48.8, 42.9, 32.7, 20]
44 [48.8, 48.1, 42.4, 32.4, 20]
45 [48.1, 47.5, 41.9, 32.1, 20]
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48 [46.3, 45.7, 40.4, 31.2, 20]
49 [45.7, 45.1, 39.9, 30.9, 20]
50 [45.1, 44.5, 39.4, 30.7, 20]
51 [44.5, 43.9, 38.9, 30.4, 20]
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74 [34.4, 34.1, 31.1, 26.2, 20]
75 [34.1, 33.8, 30.9, 26.0, 20]
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77 [33.5, 33.2, 30.4, 25.7, 20]
78 [33.2, 32.9, 30.2, 25.6, 20]
79 [32.9, 32.6, 30.0, 25.5, 20]
80 [32.6, 32.3, 29.8, 25.4, 20]
81 [32.3, 32.0, 29.6, 25.3, 20]
82 [32.0, 31.7, 29.4, 25.2, 20]
83 [31.7, 31.4, 29.2, 25.1, 20]
84 [31.4, 31.2, 29.0, 25.0, 20]
85 [31.2, 30.9, 28.8, 24.9, 20]
86 [30.9, 30.7, 28.6, 24.8, 20]
87 [30.7, 30.5, 28.4, 24.7, 20]
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90 [30.1, 29.9, 27.8, 24.4, 20]
91 [29.9, 29.7, 27.6, 24.3, 20]
92 [29.7, 29.5, 27.5, 24.2, 20]
93 [29.5, 29.3, 27.3, 24.1, 20]
94 [29.3, 29.1, 27.2, 24.0, 20]
95 [29.1, 28.9, 27.0, 23.9, 20]
96 [28.9, 28.7, 26.9, 23.8, 20]
97 [28.7, 28.5, 26.7, 23.7, 20]
98 [28.5, 28.3, 26.5, 23.6, 20]
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100 [28.1, 27.9, 26.2, 23.4, 20]
101 [27.9, 27.7, 26.1, 23.3, 20]
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103 [27.5, 27.3, 25.8, 23.1, 20]
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131 [24.2, 24.1, 23.1, 21.8, 20]
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140 [23.3, 23.2, 22.6, 21.4, 20]
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143 [23.0, 22.9, 22.3, 21.3, 20]
144 [22.9, 22.8, 22.2, 21.3, 20]
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156 [22.2, 22.1, 21.8, 21.1, 20]
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161 [22.1, 22.1, 21.8, 21.1, 20]
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180 [22.1, 22.1, 21.8, 21.1, 20]
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183 [22.1, 22.1, 21.8, 21.1, 20]
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185 [22.1, 22.1, 21.8, 21.1, 20]
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188 [22.1, 22.1, 21.8, 21.1, 20]
189 [22.1, 22.1, 21.8, 21.1, 20]
190 [22.1, 22.1, 21.8, 21.1, 20]
191 [22.1, 22.1, 21.8, 21.1, 20]
192 [22.1, 22.1, 21.8, 21.1, 20]
193 [22.1, 22.1, 21.8, 21.1, 20]
194 [22.1, 22.1, 21.8, 21.1, 20]
195 [22.1, 22.1, 21.8, 21.1, 20]
196 [22.1, 22.1, 21.8, 21.1, 20]
197 [22.1, 22.1, 21.8, 21.1, 20]
198 [22.1, 22.1, 21.8, 21.1, 20]
199 [22.1, 22.1, 21.8, 21.1, 20]
```
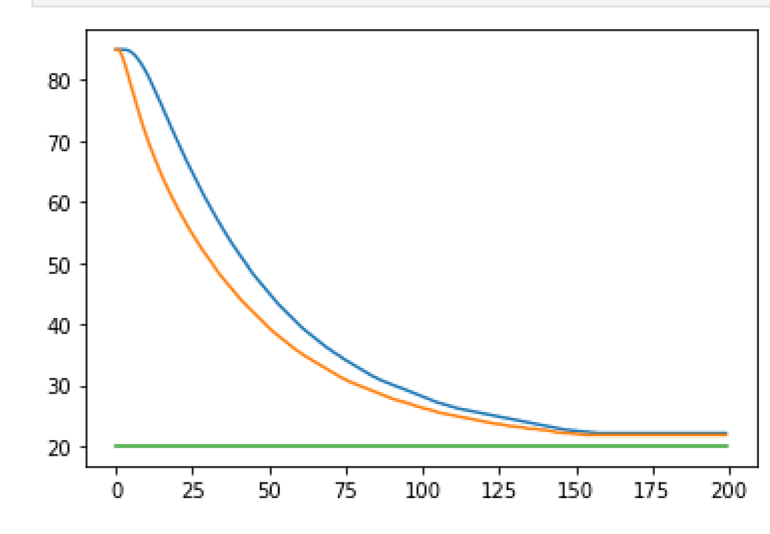

In [5]:

```
left = []
mid = []
right = []
for i in range(len(temp)):
    left.append(temp[i][0])
    mid.append(temp[i][2])
    right.append(temp[i][4])

plt.plot(left)
plt.plot(mid)
plt.plot(right)

plt.show()
```



In [ ]: