

## Directions for EarSketch Functions Exercise Exercise 3

**Pre Setup:** Follow the directions at: <http://ears sketch.gatech.edu/category/learning/ears sketch-social-media-site/creating-an-account> to setup up your EarSketch account. Make sure you remember your username and password.

**Description:** Up until now we have written sequential code to define and run musical clips and rhythmic units. However, music usually comes in sections (Verse, Chorus, Bridge . . .) that repeat during the song. In order to utilize the full value of programming, we will define functions for each section of music. A function (or method) is like a set of directions that the computer can follow to run a section of code. We will define functions for sectionA() and sectionB() in our music.

### **Vocabulary:**

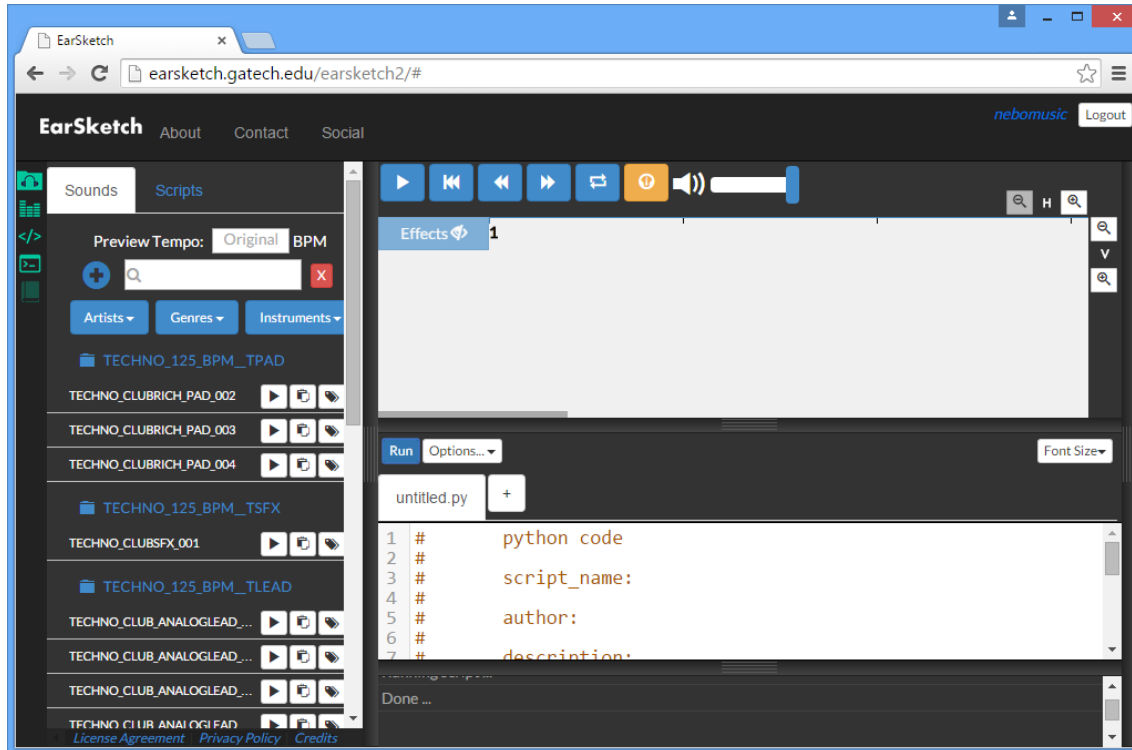
**Function:** Reusable section of code that can be defined and called within the program. Functions can take parameters and return values.

**Define:** Taking a section of code and wrapping it inside a function definition. Set off by the keyword 'def'

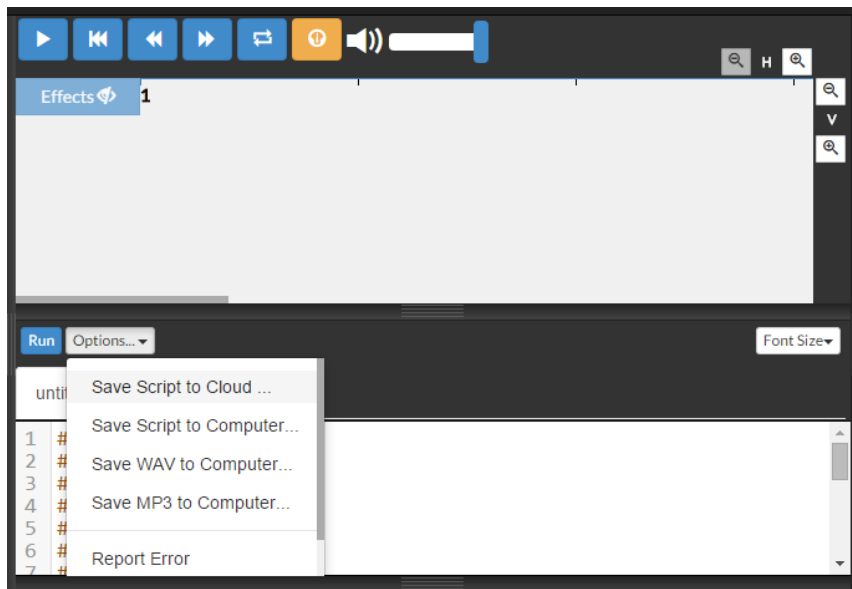
**Parameters:** Variables used in the function definition to pass values into the function.

## Process:

1. Go to <http://earsketch.gatech.edu/earsketch2/#/viewport> and login with your EarSketch Account and password.



2. Select "Options → Save Script to Cloud":



3. Name the script 'lastname\_functions'. Click 'Save'


Names can only include letters and numbers. Do not use special characters or spaces.  
Save script as (e.g. myscript): .py

4. Place you name and script name in the comments section.

Load Script ▾ More options... ▾ Font Size ▾

```
1 # python code
2 #
3 # script_name: lastname_functions
4 #
5 # author: Firstname Lastname
6 #
7 # description: defining functions
8 #
9 #
10 #
11
12 from earsketch import *
13
14 init()
15 setTempo(120)
16
17
18
19 finish()
20
```

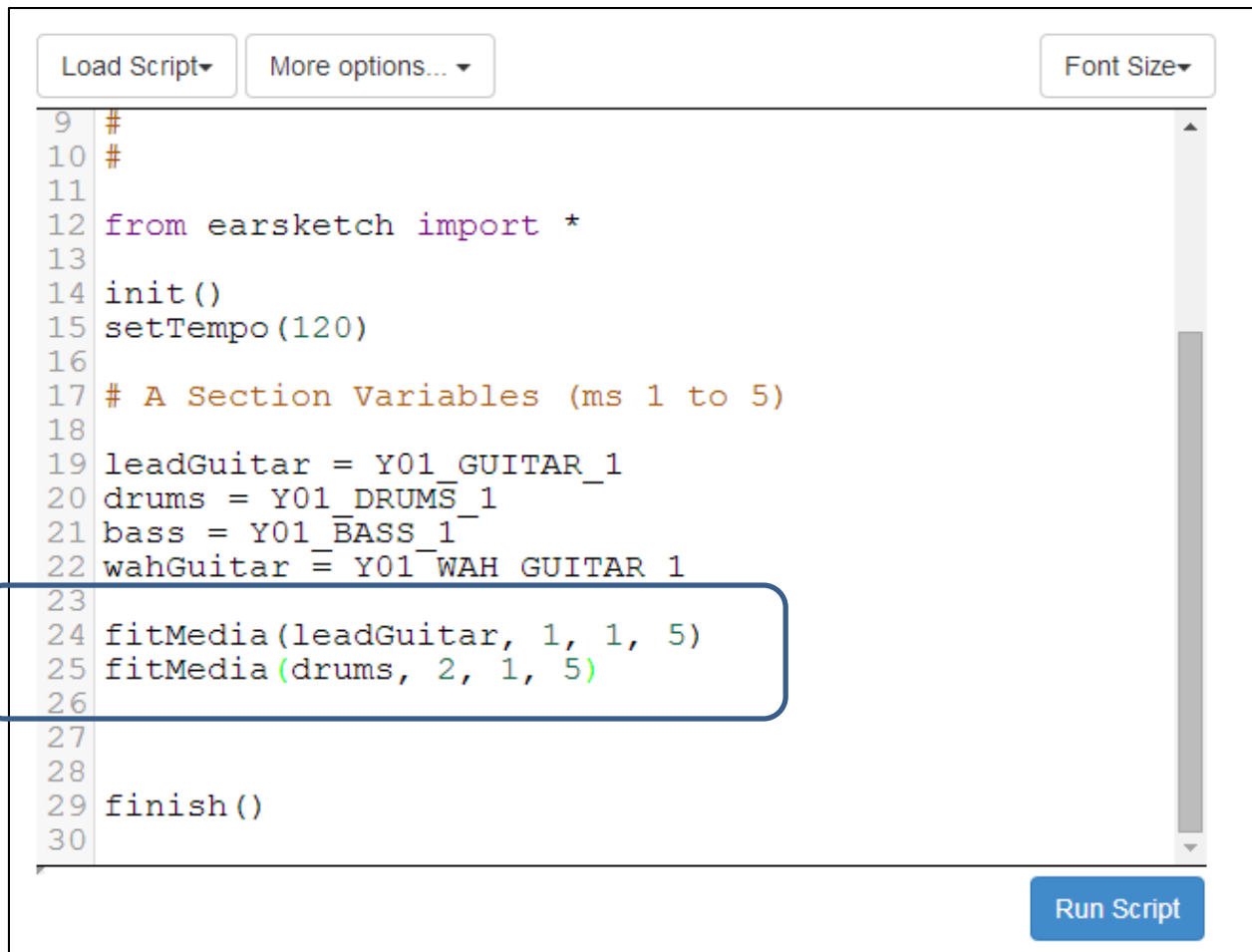
5. We will now define some variables for the A section of this arrangement: (You may pick any sounds you wish. I suggest you stay with the YOUNGGURU sounds for this exercise)



```
6 #
7 #     description: defining functions
8 #
9 #
10 #
11
12 from earsketch import *
13
14 init()
15 setTempo(120)
16
17 # A Section Variables (ms 1 to 5)
18 leadGuitar = Y01_GUITAR_1
19 drums = Y01_DRUMS_1
20 bass = Y01_BASS_1
21 wahGuitar = Y01_WAH_GUITAR_1
22
23
24
25
26 finish()
27
```

Run Script

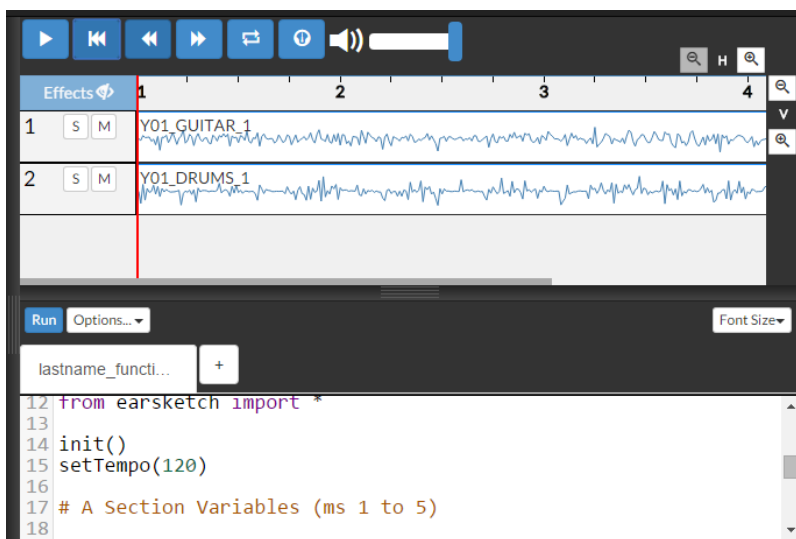
6. Now write the fitMedia() commands to place the guitar and drums on tracks 1 and 2.



```
9 #
10 #
11
12 from earsketch import *
13
14 init()
15 setTempo(120)
16
17 # A Section Variables (ms 1 to 5)
18
19 leadGuitar = Y01_GUITAR_1
20 drums = Y01_DRUMS_1
21 bass = Y01_BASS_1
22 wahGuitar = Y01_WAH_GUITAR_1
23
24 fitMedia(leadGuitar, 1, 1, 5)
25 fitMedia(drums, 2, 1, 5)
26
27
28
29 finish()
30
```

Run Script

7. Click 'Run' and then 'Play' to listen to the code.



Effects 1 2 3 4

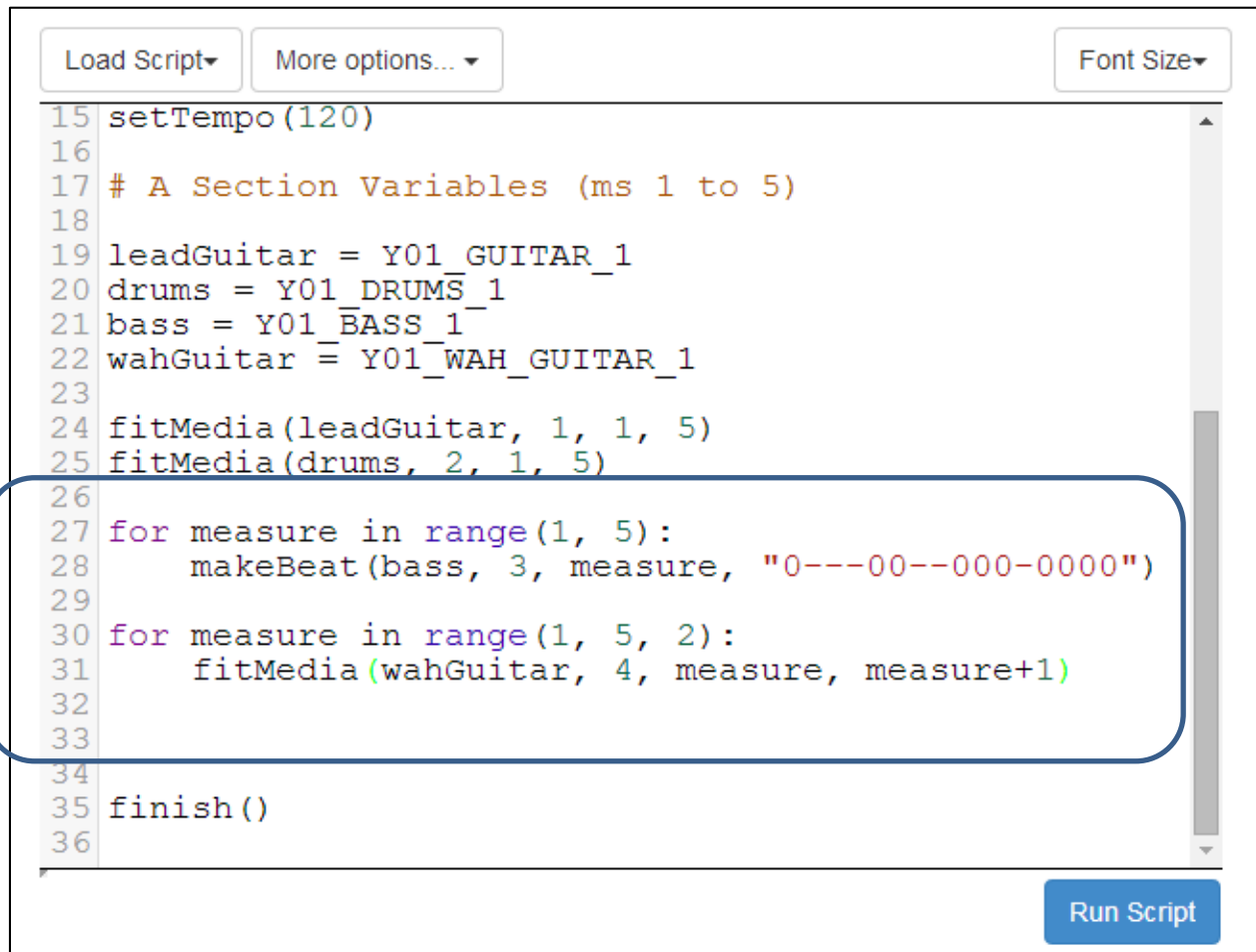
1 S M Y01\_GUITAR\_1

2 S M Y01\_DRUMS\_1

Run Options... Font Size

```
12 from earsketch import *
13
14 init()
15 setTempo(120)
16
17 # A Section Variables (ms 1 to 5)
18
```

8. We will now place two for loops and makeBeat() calls to create some rhythms.



```
15 setTempo(120)
16
17 # A Section Variables (ms 1 to 5)
18
19 leadGuitar = Y01_GUITAR_1
20 drums = Y01_DRUMS_1
21 bass = Y01_BASS_1
22 wahGuitar = Y01_WAH_GUITAR_1
23
24 fitMedia(leadGuitar, 1, 1, 5)
25 fitMedia(drums, 2, 1, 5)
26
27 for measure in range(1, 5):
28     makeBeat(bass, 3, measure, "0---00--000-0000")
29
30 for measure in range(1, 5, 2):
31     fitMedia(wahGuitar, 4, measure, measure+1)
32
33
34
35 finish()
36
```

9. Click 'Run' and listen to your music.

10. Write some code for a B section for measures 5 to 9. Here is an example:

```
Load Script▼ More options...▼ Font Size▼
27 fitMedia(leadGuitar, 1, start, end)
28 fitMedia(drums, 2, start, end)
29
30 for measure in range(start, end):
31     makeBeat(bass, 3, measure, "0---00--000-0000")
32
33 for measure in range(start, end, 2):
34     fitMedia(wahGuitar, 4, measure, measure+1)
35
36 # B Section: 5 to 9
37
38 openHats = Y01_OPEN_HI_HATS_1
39 crash = Y01_CRASH_1
40 wahGuitar2 = Y01_WAH_GUITAR_2
41
42 fitMedia(openHats, 1, 5, 9)
43 fitMedia(crash, 2, 5, 9)
44 fitMedia(wahGuitar2, 3, 5, 9)
45
46
47 finish()
48
```

Run Script

11. Run the script and listen. Adjust variables as needed.

12. We are now going to use variables to define the start and end. Define the start and end variables above the A section.

```
Load Script▼ More options...▼ Font Size▼
16
17 # A Section Variables (ms 1 to 5)
18
19 # define start and end variables
20 start = 1
21 end = 5
22
23 leadGuitar = Y01_GUITAR_1
24 drums = Y01_DRUMS_1
25 bass = Y01_BASS_1
26 wahGuitar = Y01_WAH_GUITAR_1
27
28 fitMedia(leadGuitar, 1, 1, 5)
29 fitMedia(drums, 2, 1, 5)
30
31 for measure in range(1, 5):
32     makeBeat(bass, 3, measure, "0---00--000-0000")
33
34 for measure in range(1, 5, 2):
35     fitMedia(wahGuitar, 4, measure, measure+1)
36
37 # B Section: 5 to 9
```

Run Script

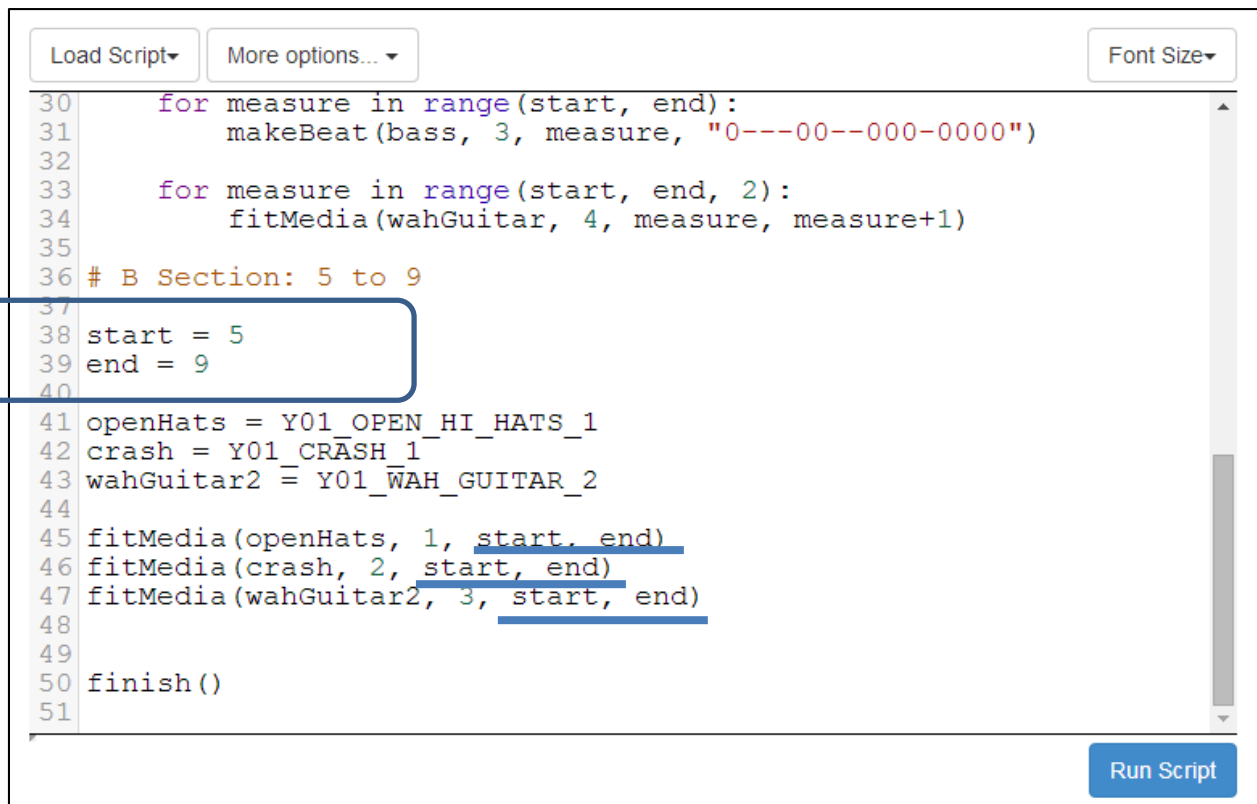


13. Work through the A Section and replace the 1 and 5 with the 'start' and 'end' variables.

```
16
17 # A Section Variables (ms 1 to 5)
18
19 # define start and end variables
20 start = 1
21 end = 5
22
23 leadGuitar = Y01_GUITAR_1
24 drums = Y01_DRUMS_1
25 bass = Y01_BASS_1
26 wahGuitar = Y01_WAH_GUITAR_1
27
28 fitMedia(leadGuitar, 1, start, end)
29 fitMedia(drums, 2, start, end)
30
31 for measure in range(start, end):
32     makeBeat(bass, 3, measure, "0---00--000-0000")
33
34 for measure in range(start, end, 2):
35     fitMedia(wahGuitar, 4, measure, measure+1)
36
37 # B Section: 5 to 9
```

Run Script

14. Repeat this procedure with the B Section. Set the start = 5 and the end = 9 and insert the variables.



The screenshot shows a code editor interface with a script. At the top, there are buttons for 'Load Script', 'More options...', and 'Font Size'. The script contains the following code:

```
30     for measure in range(start, end):
31         makeBeat(bass, 3, measure, "0---00--000-0000")
32
33     for measure in range(start, end, 2):
34         fitMedia(wahGuitar, 4, measure, measure+1)
35
36 # B Section: 5 to 9
37
38 start = 5
39 end = 9
40
41 openHats = Y01_OPEN_HI_HATS_1
42 crash = Y01_CRASH_1
43 wahGuitar2 = Y01_WAH_GUITAR_2
44
45 fitMedia(openHats, 1, start, end)
46 fitMedia(crash, 2, start, end)
47 fitMedia(wahGuitar2, 3, start, end)
48
49
50 finish()
51
```

The lines 37-39 are highlighted with a blue box. At the bottom right, there is a 'Run Script' button.

15. Run the script and check the music. Note that the sound of the music does not change. However, the use of variables for start and end will give us flexibility when we write functions and parameters.

16. We will now define a function for the A section. Starting on line 17 (above the variables start and end), write the function definition:

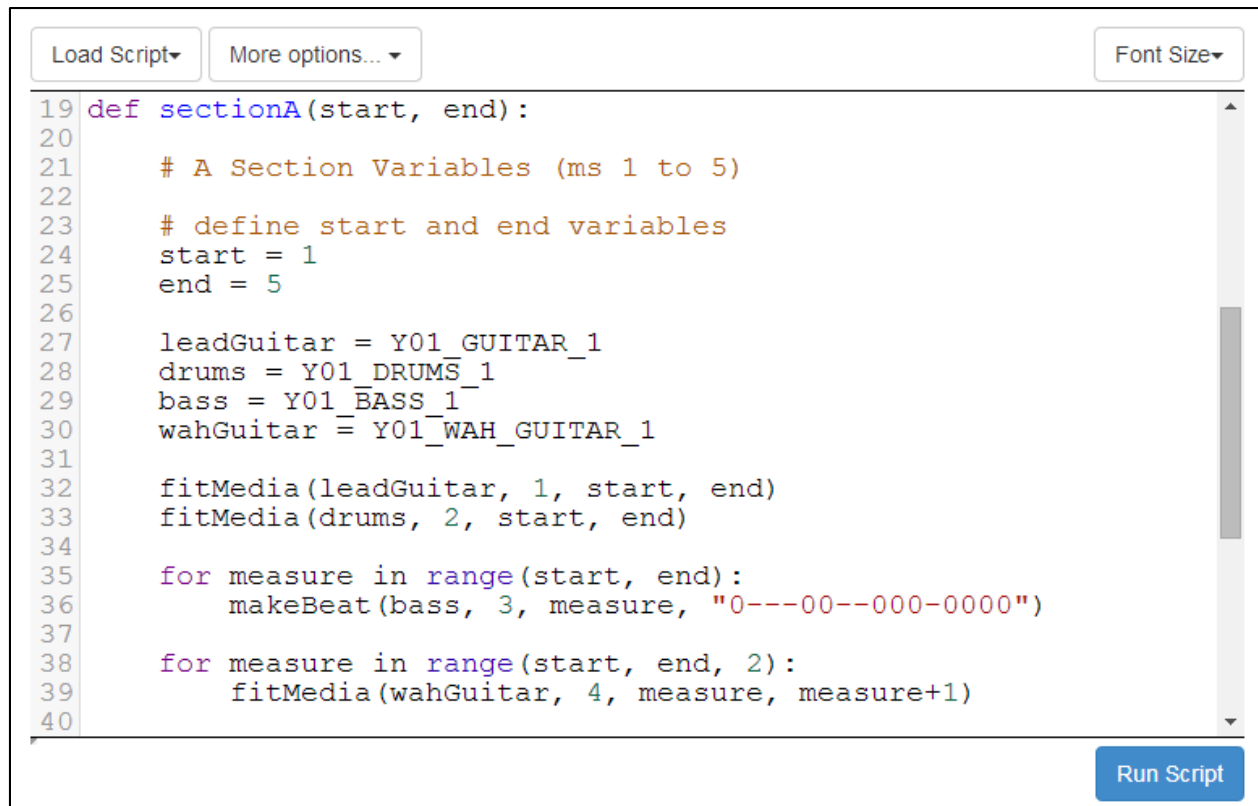
```
9 #
10 #
11
12 from earsketch import *
13
14 init()
15 setTempo(120)
16
17 # Define Function for section A
18
19 def sectionA(start, end):
20
21 # A Section Variables (ms 1 to 5)
22
23 # define start and end variables
24 start = 1
25 end = 5
26
27 leadGuitar = Y01_GUITAR_1
28 drums = Y01_DRUMS_1
29 bass = Y01_BASS_1
30 wahGuitar = Y01_WAH_GUITAR_1
```

17. Note use of the word 'def' (means 'define function as') and the use of the ':' at the end of the line. Every line of code that is tabbed after the ':' will belong to the function.

```
# Sample Function - Do not type in your code
def myFunction(start, end):
    music = Y01_DRUMS_1
    fitMedia(music, 1, start, end)
    # End of Function
```

Note the Use of the Tab after the ':'  
All code tabbed is part of the function.

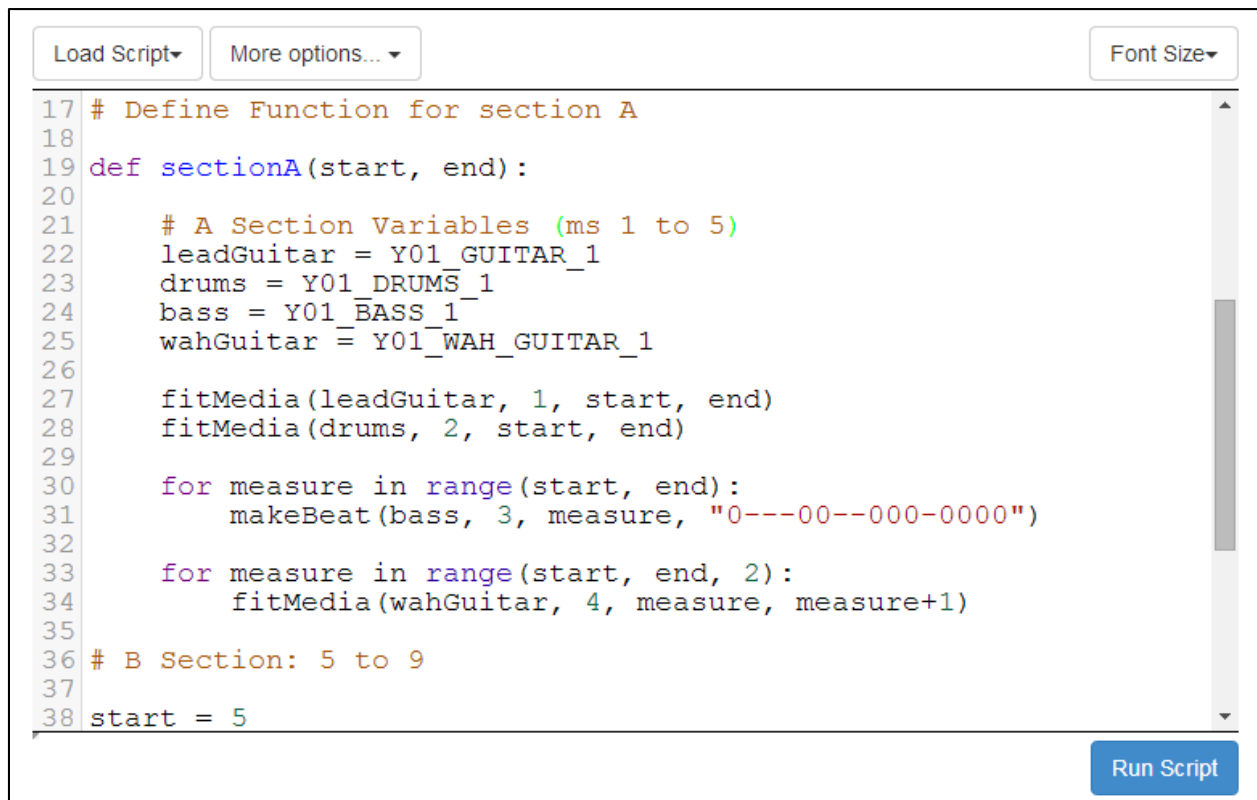
18. Now we need to 'tab' over the sectionA variables and code to match it with the function.



```
19 def sectionA(start, end):
20
21     # A Section Variables (ms 1 to 5)
22
23     # define start and end variables
24     start = 1
25     end = 5
26
27     leadGuitar = Y01_GUITAR_1
28     drums = Y01_DRUMS_1
29     bass = Y01_BASS_1
30     wahGuitar = Y01_WAH_GUITAR_1
31
32     fitMedia(leadGuitar, 1, start, end)
33     fitMedia(drums, 2, start, end)
34
35     for measure in range(start, end):
36         makeBeat(bass, 3, measure, "0---00--000-0000")
37
38     for measure in range(start, end, 2):
39         fitMedia(wahGuitar, 4, measure, measure+1)
40
```

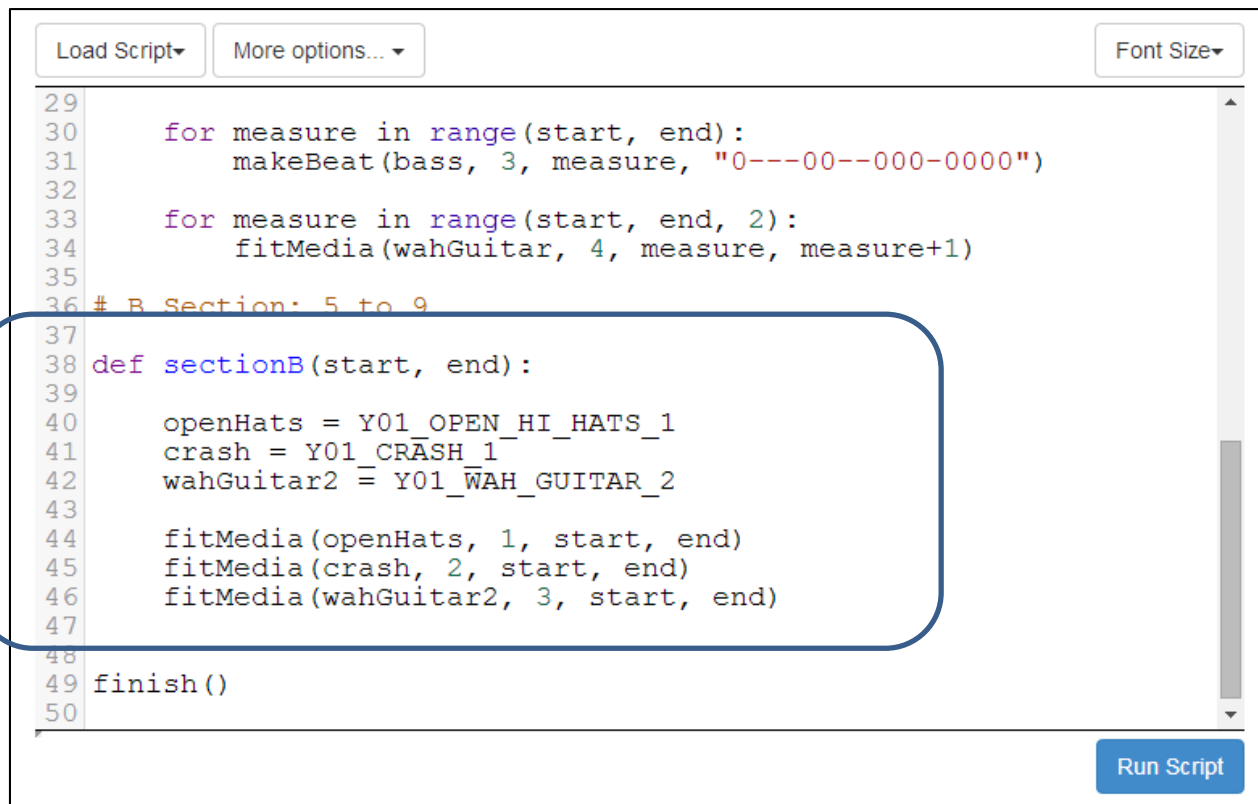
Run Script

18. Delete the 'start = 1' and 'end = 5' commands. We are now pulling these from the parameters. (Lines 24 and 25 in my example)



```
17 # Define Function for section A
18
19 def sectionA(start, end):
20
21     # A Section Variables (ms 1 to 5)
22     leadGuitar = Y01_GUITAR_1
23     drums = Y01_DRUMS_1
24     bass = Y01_BASS_1
25     wahGuitar = Y01_WAH_GUITAR_1
26
27     fitMedia(leadGuitar, 1, start, end)
28     fitMedia(drums, 2, start, end)
29
30     for measure in range(start, end):
31         makeBeat(bass, 3, measure, "0---00--000-0000")
32
33     for measure in range(start, end, 2):
34         fitMedia(wahGuitar, 4, measure, measure+1)
35
36 # B Section: 5 to 9
37
38 start = 5
```

19. Repeat the same procedure for your B section. Here is a finished example:



```
29
30     for measure in range(start, end):
31         makeBeat(bass, 3, measure, "0---00--000-0000")
32
33     for measure in range(start, end, 2):
34         fitMedia(wahGuitar, 4, measure, measure+1)
35
36 # B Section: 5 to 9
37
38 def sectionB(start, end):
39
40     openHats = Y01_OPEN_HI_HATS_1
41     crash = Y01_CRASH_1
42     wahGuitar2 = Y01_WAH_GUITAR_2
43
44     fitMedia(openHats, 1, start, end)
45     fitMedia(crash, 2, start, end)
46     fitMedia(wahGuitar2, 3, start, end)
47
48
49 finish()
50
```

Load Script ▾ More options... ▾ Font Size ▾

Run Script

20. Now we have defined an A and B section with the functions sectionA() and sectionB(). Click 'Run' and note that the music is now blank.

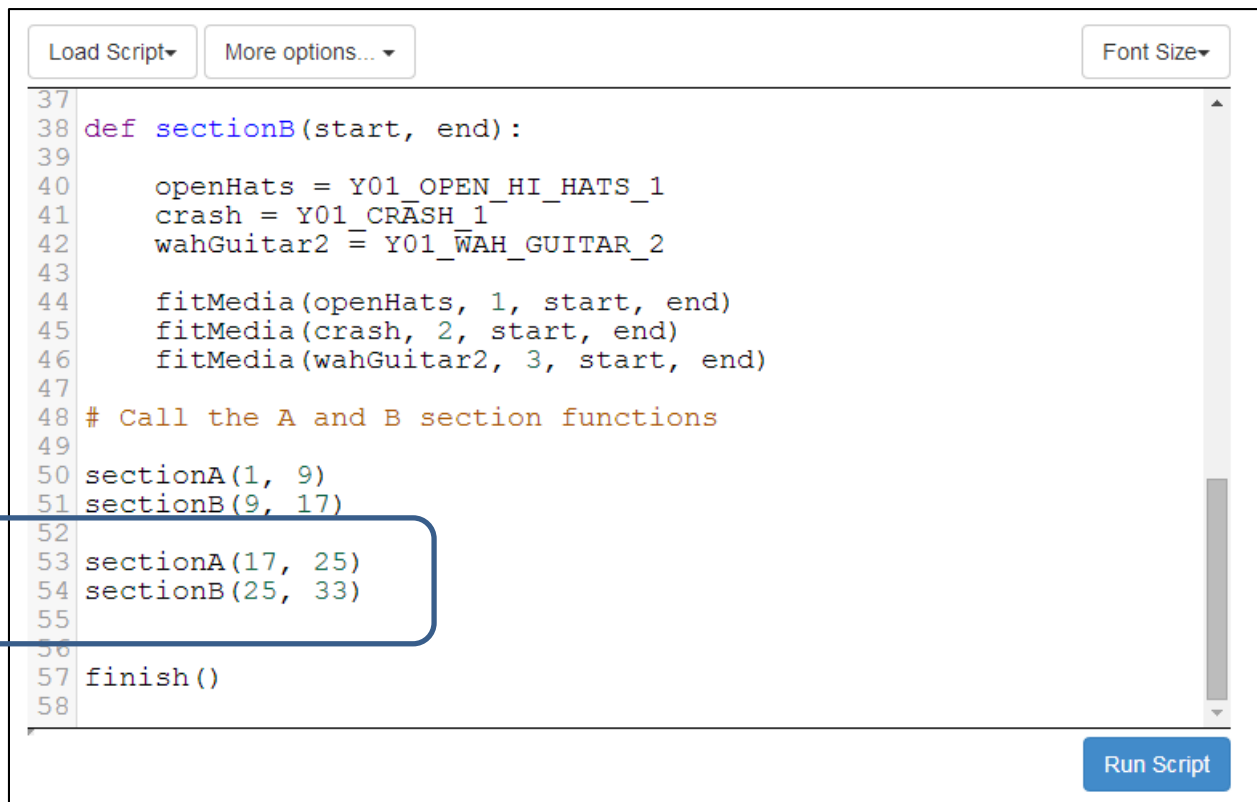


The reason is that we have defined the functions – telling the computer how we want the music assembled. However, we have not told the computer where and when to run these functions. Functions are like little computer programs within a big program. Go to the Code Editor View and call the functions:





21. Let us say we want to repeat the A section from measures 17 to 25 and the B section from 25 to 33 (making an ABAB form). We can do this by adding two additional lines of code:



```
37
38 def sectionB(start, end):
39
40     openHats = Y01_OPEN_HI_HATS_1
41     crash = Y01_CRASH_1
42     wahGuitar2 = Y01_WAH_GUITAR_2
43
44     fitMedia(openHats, 1, start, end)
45     fitMedia(crash, 2, start, end)
46     fitMedia(wahGuitar2, 3, start, end)
47
48 # Call the A and B section functions
49
50 sectionA(1, 9)
51 sectionB(9, 17)
52
53 sectionA(17, 25)
54 sectionB(25, 33)
55
56
57 finish()
58
```

Load Script ▾ More options... ▾ Font Size ▾

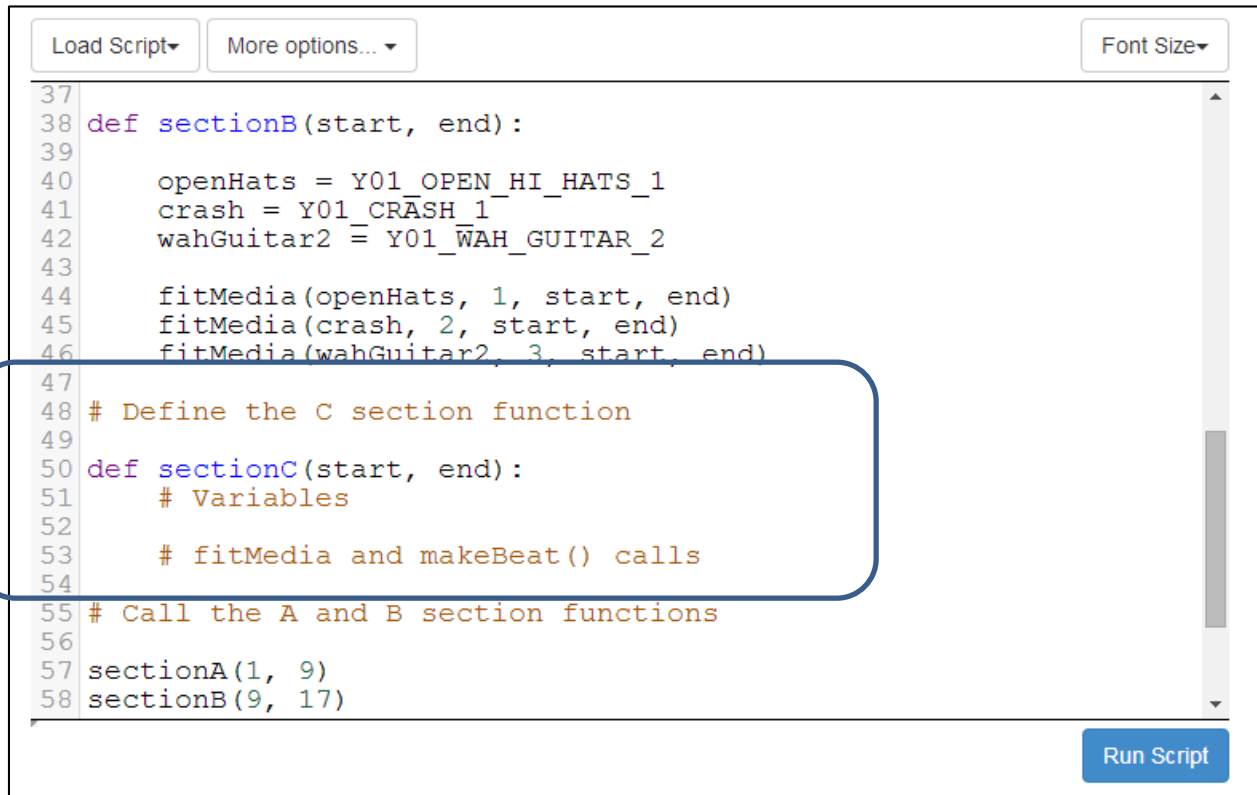
Run Script

22. Click 'Run Script' and note that you now have 33 measures of music.

23. Assignment Requirements:

- a. Write a sectionC(start, end) function with 3 additional sounds. I suggest you select another Young Guru library in a related key (same letter).
- b. The sectionC function should use a for loop and makeBeat() in addition to fitMedia()
  - b. Extend your form so the music follows the (ABABCBB) pattern by calling the functions.

Hint: You can start defining the sectionC() function below section B:



```
37
38 def sectionB(start, end):
39
40     openHats = Y01_OPEN_HI_HATS_1
41     crash = Y01_CRASH_1
42     wahGuitar2 = Y01_WAH_GUITAR_2
43
44     fitMedia(openHats, 1, start, end)
45     fitMedia(crash, 2, start, end)
46     fitMedia(wahGuitar2, 3, start, end)
47
48 # Define the C section function
49
50 def sectionC(start, end):
51     # Variables
52
53     # fitMedia and makeBeat() calls
54
55 # Call the A and B section functions
56
57 sectionA(1, 9)
58 sectionB(9, 17)
```

Run Script