

# Midterm 1 Review

## *So it goes when you do your scales and your arpeggios*

### Lecture 12

An **arpeggio** is a musical structure wherein one plays a series of notes, one after the other, usually at even intervals. For example, if you wanted to play an arpeggio based on the **C-major** chord, you would play the following notes, one after the other:

C -> E -> G -> C -> E -> G -> C -> E -> G

**Figure 1:** The C-major chord being arpeggiated in the "up" direction 3 times.

In music production, an **arpeggiator** is a type of synthesiser that collection a number of notes from the user and plays those notes over and over again, in any direction and as many times that the user may choose. A great example that makes awesome use of arpeggiators is the track **Resurrections** by **Lena Raine**, from the **Celeste** original soundtrack.

**Note:** We will be writing our code in the file **review.py**.

We will be simulating a user entering notes into an arpeggiator, which will then arpeggiate those notes either up or down as many times as the user wants. I have already created a simple arpeggiator for us to use:

```
import arpeggiator

ARPEGGIATOR = arpeggiator.Arpeggiator()
```

You can use this `ARPEGGIATOR` constant the way you use `turtle` (i.e. you can use its methods). For example, if you want to input a note into the arpeggiator, you would do something like this:

```
ARPEGGIATOR.add_note("Eb") # Adding an E-flat into the arpeggiator
ARPEGGIATOR.add_note("Bb") # Adding a B-flat into the arpeggiator
ARPEGGIATOR.add_note('C')  # Adding a C into the arpeggiator
ARPEGGIATOR.add_note("G#") # Adding a G-sharp into the arpeggiator
ARPEGGIATOR.add_note('G')  # Adding a G into the arpeggiator
ARPEGGIATOR.add_note(("D-minor")) # Adding an invalid note to the arpeggiator
```

Output (this output is generated by ARPEGGIATOR ):

Note 'Eb' added!

Note 'Bb' added!

Note 'C' added!

Note 'G#' added!

Note 'G' added!

WARNING: 'D-minor' is not a valid note.

VALID NOTES: Ab, A#, A, Bb, B, C#, C, Db, D#, D, Eb, E, F#, F, Gb, G#, G

You can confirm which notes you have added to your arpeggiator by printing it:

```
print(ARPEGGIATOR)
```

Output:

Arpeggiator (notes: Eb, Bb, C, G#, G)

You can also play your arpeggiator by using the `play()` method. The default direction of the `play()` method is `UP` , but you can also ask it to play it backwards by passing `DOWN` into its parentheses:

```
# These two lines are included in your starter file
# Don't worry about what they mean or how they work
UP = arpeggiator.Direction.UP
DOWN = arpeggiator.Direction.DOWN
```

```
print("In order:")
ARPEGGIATOR.play()
```

```
print("\nIn Order:")
```

```
ARPEGGIATOR.play(UP)

print("\nBackwards:")
ARPEGGIATOR.play(DOWN)
```

Output:

In order:

```
~G
~~~G#
~~~~~C
~~~~Bb
~Eb
```

In Order:

```
~G
~~~G#
~~~~~C
~~~~Bb
~Eb
```

Backwards:

```
~Eb
~~~~Bb
~~~~~C
~~~G#
~G
```

Our goal is the following:

1. As the user to enter any notes into the arpeggiator. The arpeggiator will check whether these notes are actual valid musical notes, so you don't need to worry about doing that. When the user is done entering notes, they should enter the word "DONE" (caps-sensitive). The user must do this to proceed.
2. Next, the user will enter a direction in which they would like the arpeggiator to play. Their choices are limited to the characters 'U' for "up" and 'D' for "down". The user must enter either of these characters to proceed.
3. Next, the user must enter how many times they would like their arpeggiator to play. The user must enter a positive, non-zero number to proceed.
4. Finally, the program should play the arpeggiator as many times and in the direction that the user selected.

Sample executions (note that I added some `print()` statements for clarity; you may format your output however you like):

```
Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: C
Note 'C' added!
```

```
Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: E
Note 'E' added!
```

```
Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: G
Note 'G' added!
```

```
Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: E
Note 'E' added!
```

```
Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: C
Note 'C' added!
```

```
Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: DONE
```

```
Arpeggiator (notes: C, E, G, E, C)
```

```
Enter an arpeggiator direction [U/D] u
```

```
Enter an arpeggiator direction [U/D] d
```

```
Enter an arpeggiator direction [U/D] U
```

```
How many times do you want your arpeggiator to play? 5
```

```
~C
~~~E
~~~~~G
~~~E
~C
~C
~~~E
~~~~~G
~~~E
~C
~C
~~~E
~~~~~G
~~~E
~C
~C
~~~E
~~~~~G
~~~E
~C
~C
~~~E
~~~~~G
~~~E
~C
~C
~~~E
```

~~~~~G  
~~~E  
~C

Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: A  
Note 'A' added!

Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: Fb  
WARNING: 'Fb' is not a valid note.  
VALID NOTES: Ab, A#, A, Bb, B, C#, C, Db, D#, D, Eb, E, F#, F, Gb, G#, G

Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: D#  
Note 'D#' added!

Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: Gb  
Note 'Gb' added!

Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: L#  
WARNING: 'L#' is not a valid note.  
VALID NOTES: Ab, A#, A, Bb, B, C#, C, Db, D#, D, Eb, E, F#, F, Gb, G#, G

Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: B-Sharp  
WARNING: 'B-Sharp' is not a valid note.  
VALID NOTES: Ab, A#, A, Bb, B, C#, C, Db, D#, D, Eb, E, F#, F, Gb, G#, G

Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: D  
Note 'D' added!

Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: E  
Note 'E' added!

Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: F  
Note 'F' added!

Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: E  
Note 'E' added!

Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: END  
WARNING: 'END' is not a valid note.  
VALID NOTES: Ab, A#, A, Bb, B, C#, C, Db, D#, D, Eb, E, F#, F, Gb, G#, G

Enter a musical note (i.e. A, Db, C#, etc.) or 'DONE' to end: DONE

Arpeggiator (notes: A, D#, Gb, D, E, F, E)

Enter an arpeggiator direction [U/D] D

How many times do you want your arpeggiator to play? -4

How many times do you want your arpeggiator to play? (Must be positive amount) 3

~E

~~~F

~~~~~E

~~~~~D

~~~~~Gb

~~~D#

~A

~A

~~~D#

~~~~~Gb

~~~~~D

~~~~~E

~~~F

~E

~E

~~~F

~~~~~E

~~~~~D

~~~~~Gb

~~~D#

~A