Assignment 4: Classes and Objects

Handout: Oct 2, 2019 on D2L
Submit by: Oct 9, 2019 12am (midnight, Tue to Wed) upload to D2L dropbox
Points: 5
Supporting material:

- Music.py
- Histogram.py
- A04_analyze_book1.py
- feynman.txt
- words.txt

1. Music Room (2.5pt)

A MusicRoom object holds a list of Instrument objects. Instruments are specialized in child classes inheriting the Instrument parent class. Instruments can play a song which sounds different if the instrument is not tuned. Different instruments de-tune differently. The following instruments are available:

1. Guitar, de-tunes after every song.
2. Bass, de-tunes after playing 2 songs.
3. Drums, always stay in tune.

MusicRoom allows to tune all instruments not currently tuned.

In `Music.py` you find skeleton code. Complete this code according to the documentation. Code sections needing implementation are marked with `# TODO:`

Human readable representation of an instrument should be:
`"a {} {} {}".format(self.year, self.brand, self.kind)`

Playing an instrument should return a string:
`"{} plays: {}".format(self.kind, song)`
if instrument is tuned and use `song.swapcase()` otherwise.

Running `python Music.py` should produce the following output:

```
Bass plays: Metallica - Nothing Else Matters
Guitar plays: Metallica - Nothing Else Matters
```

```
Drums plays: Metallica - Nothing Else Matters

Bass plays: Metallica - Nothing Else Matters
Guitar plays: mETALLICA - nOTHING eLSE mATTERS
Drums plays: Metallica - Nothing Else Matters

Bass plays: mETALLICA - nOTHING eLSE mATTERS
Guitar plays: mETALLICA - nOTHING eLSE mATTERS
Drums plays: Metallica - Nothing Else Matters

    Tuning a 2001 Ibanez Bass
    Tuning a 1998 Fender Guitar
Done tuning

Bass plays: Metallica - Nothing Else Matters
Guitar plays: Metallica - Nothing Else Matters
Drums plays: Metallica - Nothing Else Matters
```

2. Analyze Book with Histogram Class (2.5pt)

The goal of this excercise is to re-factor analyze_book1 we saw in Assignment03 by creating a class called Histogram that can count elements from a list. This class extends Python `dict`.

In `Histogram.py` and `A04_analyze_book1.py` you find skeleton code. Complete this code according to the documentation. Code sections needing implementation are marked with `# TODO:`. Use `http://thinkpython2.com/code/analyze_book1.py` as a reference and help.

Running `python Histogram.py` should produce the following output:

```
*** Test Initialize with count()
   PASS
*** Test int hist most_common all
   PASS
*** Test char hist most_common n=3
   PASS
*** Test word hist most_common n=5
   PASS
```

Running `python A04_analyze_book1.py` with `feynman.txt` and `word.txt` should produce the following output:

```
Total number of words: 1078
Number of different words: 379
The most common words are:
67      the
```

```
44      of
36      to
35      is
25      we
22      and
22      a
21      that
21      in
17      it
13      but
12      so
11      you
11      laws
11      be
11      are
10      first
9      this
9      law
9      all
The words in the book that aren't in the word list are:
a euclidean relativity

Here are some random words from the book
there another every example appreciable are then grasp easier piece kind
two from of and things spinning of this at the it knowledge we let you
the first big as training has three of at page  hints entire outline
first are law or be you constant possible significant to labor more a let
knowledge more all physics is the light ideas for years and of basic
science of and so arises now so in background mass was fact in our
velocity we is the knowledge to conceptual is how so fun an known
therefore there truth it concentrate how again
```

Note that the random words will likely be different.

What to hand in

Upload three python files to D2L dropbox with solutions to above exercises:

1. Music.py
2. A04_analyze_book1.py
3. Histogram.py