Lab 7: Dictionaries

In this lab, we'll practice using dictionaries in preperation for P7 (and exam 2!). Start a new scratch notebook to do the exercises.

Exercises

Counting Letters

Fill in the blanks so that `counts` becomes a dictionary where each key is a character and the corresponding value is how many times it appeared in `text`.

```
text = "do, re, do, re, mi, do, re, mi, fa, sol, la, ti"
counts = {}
for char in ????:
    if not char in counts:
        counts[????] = ????
    else:
        ????[char] += ????
counts
```

If done correctly, you should see something like this:

```
{'d': 3, 'o': 4, ',': 11, ' ': 11, 'r': 3, 'e': 3, 'm': 2, 'i': 3, 'f': 1, 'a': 2, 's': 1, 'l': 2, 't': 1}
```

Counting Words

```
text = "do, re, do, re, mi, do, re, mi, fa, sol, la, ti"
counts = {}
for word in text.????(????):
    if ????:
        ????
    else:
        ????
counts
```

If done correctly, you should see something like this:

```
{'do': 3, 're': 3, 'mi': 2, 'fa': 1, 'sol': 1, 'la': 1, 'ti': 1}
```

Dictionary from Two Lists

Fill in the blanks:

```
keys = ["dog", "cat", "bird"]
vals = ["perro", "gato", "pájaro"]
en2sp = ???? # empty dictionary
for i in range(len(????)):
    en2sp[keys[????]] = ????
en2sp
```

The resulting dictionary should map the English words to the Spanish words, like this:

```
{'dog': 'perro', 'cat': 'gato', 'bird': 'pájaro'}
```

Try using your dictionary:

```
words = "the dog chased the cat down the stairs".split(" ")
for i in range(len(words)):
    default = words[i] # don't translate it
    words[i] = en2sp.get(words[i], default)
" ".join(words)
```

Not exactly going to replace Google translate any time soon, but it's a start...

Flipping Keys and Values

What if we want a dictionary to convert from Spanish back to English? Complete the code:

```
sp2en = {}
for en in en2sp:
    sp = ????
    sp2en[sp] = ????
sp2en
```

You should get this:

```
{'perro': 'dog', 'gato': 'cat', 'pájaro': 'bird'}
```

Dictionary Division

What if we want to do a lot of division, but we have all our numerators in one dictionary and all our denominators in another?

```
numerators = {"A": 1, "B": 2, "C": 3}
denominators = {"A": 2, "B": 4, "C": 4}
result = {}
for key in ????:
    result[????] = ????[key] / ????[key]
result
```

If done correctly, you should get `{'A': 0.5, 'B': 0.5, 'C': 0.75}`.

Ordered Print

Complete the code so it prints the incidents per year, with earliest year first, like this:

```
incidents = {2016: 14, 2017: 13, 2018: 16, 2014: 8, 2015: 10}
keys = sorted(list(????.keys()))
for k in ????:
    print(k, incidents[????])
```

```
2014 8
2015 10
2016 14
2017 13
2018 16
```

Histogram

Modify the above code so it prints a histogram with letters, like this:

```
2014 ********
2015 **********
2016 **************
2017 *************
2018 ****************
```

Dictionary Max

Complete the following to find the year with the most incidents:

```
incidents = {2016: 14, 2017: 13, 2018: 16, 2014: 8, 2015: 10}
best_key = None
for key in incidents:
    if best_key == None or incidents[????] > incidents[????]:
        best_key = ????
print("Year", best_key, "had", incidents[????], "incidents (the max)")
```

Project Hints

1. for project questions like q12, you'll need to pair up two lists to make a dictionary (review "Dictionary from Two Lists" from the lab)
2. q16 and q17 require some counting (review the first lab exercises)
3. q18 and q19 require an average (review "Dictionary Division" above).
4. q20 is finding the key that yields the max value in a dictionary (in comparison, we've solved many problems prior involving finding the argument that yields the max return value from a function)