NAME _____ **ICA-2**

NetID _____ @email.arizona.edu

Total time: 10 minutes. **Speak** to your neighbor!

---

1. [5 points] Consider the following fragment of Python:

```
v = "ABCDEFGHIJ"
w = ( ('aa','ab','bc'), (12, 23, 34), [45, 56, 67, 78] )
x = { 'abc' : 12, 'cde' : 34, 'efg' : 56 }
y = [ ['pqr', 'stu','abc','def'], ['uvw','xyz','bcd','cde'] ]
```

(a) [4 points] For each of the variables v, w, x, y: indicate what kind of a data object its value is (i.e., number, list, dictionary, etc.).

(b) [1 points] What are the contents of x after the following statement:

```
x[ v[2:4].lower() ] = w[1][2]
```

2. [3 points] Write a Python function **num_keys**(*d*) that takes as argument a 2-level dictionary *d* and returns the total number of *keys* in *d*, counting keys at both levels of *d*. Duplicates should be considered as distinct and counted separately. For example, in the dictionary

```
mydict = { 12 : { 'a' : 11, 'b': 22}, 23 : { 'a' : 33, 'b': 44, '5': 55 } }
```

there are two keys at the first level (12, 23) and five keys at the second level, for a total of seven keys. Thus, **num_keys**(*mydict*) should return 7.

3. [2 points] Write a function `remove_first(tup)` that takes a tuple as an argument and returns a new tuple consisting of all elements of `tup` except the first. Use an assert to enforce that the argument `tup` is a non-empty.