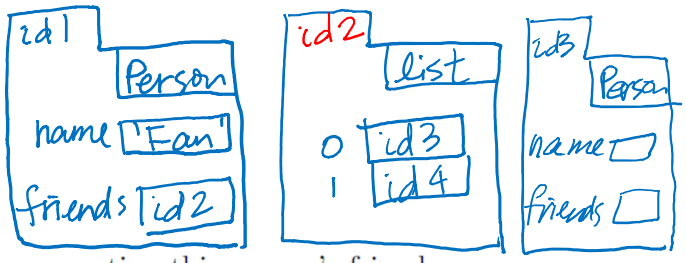
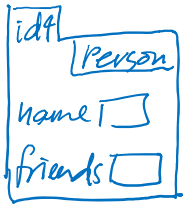
4. **Objects and Functions**

Consider a `Person` class with the attributes

- `name`: a string representing the name of this person
- `friends`: a (possibly empty) list of Person objects representing this person's friends





(a) [10 points] Implement the following function according to the specifications. Your implementation **must make effective use of `range()` in a for-loop.**

Hint: Recall the Python keyword `in`, which returns `True` if a value is in a sequence, and `False` otherwise. For example, `2 in [2, 3, 4]` evaluates to `True`, but `5 in [2, 3, 4]` evaluates to `False`.

```
def common(f1, f2):
    """Returns: a string list containing the names of the people that are in
    both Person list f1 and Person list f2.

    Example: Let p1, p2, ..., p6 be Person objects.  If f1 is the list
    [p2, p3, p5] and f2 is the list [p3, p4, p6, p5], then common(f1, f2)
    returns a list containing the names of p3 and p5 (not p3 and p5 themselves).

    Precondition: f1 and f2 are each a nonempty list of Person objects.
    """
```

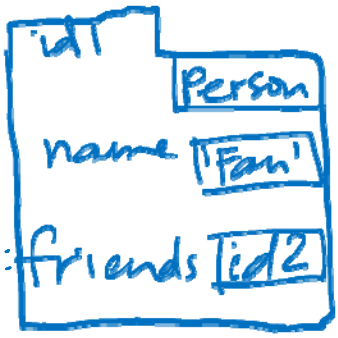
```
namesList = []
for k in range(len(f1)):
    p = f1[k]
    if p in f2:
        namesList.append(p.name)
return namesList
```

append
for
in
range

(b) [5 points] Implement function `mutual_friends` according to the specifications below. Your implementation must use function `common` from part (a) in a meaningful way. Assume `common` has been correctly implemented. Pay attention to the specifications of both `mutual_friends` and `common`.

```
def mutual_friends(p1, p2):
    """Returns: a string list containing the names of the mutual friends of
    Persons p1 and p2.  If p1 and p2 have no mutual friends, return an empty
    list.

    Precondition: p1 and p2 are each a Person object.
    """
```




```
if p1.friends == [] or p2.friends == []:
    return []

return common(p1.friends, p2.friends)
```

(c) [9 points] Implement the following function according to the specifications below. Your implementation **must use a "for-each" loop meaningfully, i.e., you cannot use `range()` in your loop.**

```
def nickname_friends(p):
    """Returns: the number of names modified.  This function modifies
    Person p's friends list such that the names longer than 5 characters will
    will be truncated to the first 5 characters and a "u" is appended.  Names 5
    characters in length or shorter remain unchanged.

    Example: If p has 3 friends named "Jonathan", "Benji", and "Tristan", then
    their names will become "Jonatu", "Benji" (unchanged), and "Tristu",
    respectively, and the function returns 2.

    Precondition: p is a Person object with a nonempty friends list.
    """
```

has 2 attributes: name (string)
friends (Person list)

```
changes = 0
for friend in p.friends:
    if len(friend.name) > 5:
        changes += 1
        friend.name = friend.name[:5] + 'u'

return changes
```

accumulation pattern
loop
access name attribute
len
string slicing
+ "u"

```
changes = 0
for friend in p.friends:
    fname = friend.name
    if len(fname) > 5
        changes += 1
        fname = fname[:5] + 'u'

return changes
```

friend.name