

CPSC120  
Fundamentals of Computer Science  
Final Exam Review

1. What is the difference between mutable and immutable data types? What are some examples of each?

2. What is aliasing? Why does it only affect mutable data types?

3. How do dictionaries differ from lists?

4. For each of the following snippets of Python code, give what would be printed to the command line if run. If the snippet will not print anything because of an error, just put error.

(a) 

```
spam = [1]
for i in range(4):
    spam.append(spam[i] + spam[i])
print(spam)
```

(b) 

```
spam = {1: 2, 2: 3}
print(spam[spam[1]])
```

(c) 

```
spam = [[1, 2, 3], [4, 5, 6], [7, 8, 9]]
eggs = []
for i in range(3):
    eggs.append(spam[i][i])
print(eggs)
```

```
(d) def spam(eggs):
    eggs.append(0)
    ham = [1, 2, 3]
    spam(ham)
    print(ham)
```

```
(e) def spam(eggs):
    eggs = eggs + "a"
    ham = "123"
    spam(ham)
    print(ham)
```

5. Write a function that takes a list of ints and returns a new list that contains all of the ints in the input list, but no duplicates. For example:

```
>>> remove_dups([1, 2, 3, 4, 5])
[1, 2, 3, 4, 5]
>>> remove_dups([1, 2, 3, 2, 1])
[1, 2, 3]
```

6. Write a Python function that returns a dictionary that represents a Vigenre Square. This dictionary can be used to assist in encoding a Vigenre cipher. You should generate this dictionary dynamically, as opposed to hard-coding the values.

```
>>> square = generate_vigenere()
>>> for key in square:
...     print(key, "->", square[key])

a -> ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j', 'k', 'l', 'm', 'n',
'o', 'p', 'q', 'r', 's', 't', 'u', 'v', 'w', 'x', 'y', 'z']
c -> ['c', 'd', 'e', 'f', 'g', 'h', 'i', 'j', 'k', 'l', 'm', 'n', 'o', 'p',
'q', 'r', 's', 't', 'u', 'v', 'w', 'x', 'y', 'z', 'a', 'b']
b -> ['b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j', 'k', 'l', 'm', 'n', 'o',
'p', 'q', 'r', 's', 't', 'u', 'v', 'w', 'x', 'y', 'z', 'a']
.
.
.
```

7. Write a function that takes a two-dimensional list of ints and returns True if all of the columns sum to the same value and False otherwise. For example:

```
>>> magic_cols([[4, 9, 2], [3, 5, 7], [8, 1, 6]])
True
>>> magic_cols([[1, 2, 3], [4, 5, 6], [7, 8, 9]])
False
```