CSE 1224 - Lab 4 - Due Tuesday, October 4 by 11:59 pm

A **dictionary** is a data structure that holds key-value pairs. Below is a dictionary with student names as keys, and final exam grades as values. Note that dictionaries begin and end with braces.

```
d = {"Mike Jones" : 97,
     "Li Jing" : 86,
     "Mary Smith" : 92,
     "Shanice Jones" : 98
     }
```

We can access the grade of a student as follows.

```
> d["Mary Smith"]
92
```

If we try to access a key that is not in the dictionary, we get an error.

```
> d["Bob Jones"]
KeyError: 'Bob Jones'
```

We can add a key-value pair to the dictionary.

```
> d["Treyvon Grant"] = 92
> d
{"Mike Jones" : 97,
  "Li Jing" : 86,
  "Mary Smith" : 92,
  "Shanice Jones" : 98
  "Treyvon Grant" : 93
}
```

The keys in a dictionary must be unique. If we try to add a key-value pair to a dictionary and the key is already in the dictionary, the value will be overwritten.

```
> d["Mike Jones"] = 100
> d
{"Mike Jones" : 100,
     "Li Jing" : 86,
     "Mary Smith" : 92,
     "Shanice Jones" : 98,
     "Treyvon Grant" : 93
}
```

We can access each key-value pair in a dictionary by using the **items()** method.

```
d = {"Mike Jones" : 100,
     "Li Jing" : 86,
     "Mary Smith" : 92,
     "Shanice Jones" : 98,
     "Treyvon Grant" : 93
}

for k, v in d.items():
  print("key: ", k, " value: ", v)
```

The code above prints out:

```
key: Mike Jones value: 100
key: Li Jing value: 86
key: Mary Smith value: 92
key: Shanice Jones value: 98
key: Treyvon Grant value: 93
```

The following code returns the highest grade earned among the students.

```
def highest_grade(d):
  highest_grade = 0
  for k, v in d.items():
    if v > highest_grade:
      highest_grade = v
  return highest_grade
```

The next code example returns the name of the student who earned the highest grade.

```
def student_with_highest_grade(d):
  highest_grade = 0
  student_name = ""
  for k, v in d.items():
    if v > highest_grade:
      highest_grade = v
      student_name = k
  return student_name
```

Problems

1) Write a function called *student_with_lowest_grade(d)* that returns the name of the student with the lowest final grade. For the dictionary above, your function should return "Li Jing". You can assume that all final grades a distinct.

2) A grade of 93 or higher is an A. Write a function called *number_of_As(d)* that returns the number of students who earned As. For the dictionary above, your function should return 3.