ENGR 102 – Fall 2021
Lab Assignment #10

Deliverables:

There are 2 deliverables for this team assignment. Please submit the following files to Mimir:

- `Lab10a_Act1a.py`
- `Lab10a_Act1b.py`

You do NOT have to submit Lab10a_input.txt, Lab10a_Act1a_valid.txt, or Lab10a_Act1b_valid.txt files.

Activity #1: *File read and write – to be done as a team*

While waiting in the security line at the airport to start your amazing international vacation, you overhear one of the TSA agents state that they're having trouble with the passport scanner. With your newly acquired knowledge of reading and writing to files in Python, you agree to help them out.

First, take a look at the file provided to you named "Lab10a_input.txt". Although initially it looks like junk, it actually contains information on all of the passports scanned so far. Your job is to figure out which passports have all of the required fields. The expected fields are

- `byr` – Birth year
- `iyr` – Issue year
- `eyr` – Expiration year
- `hgt` – Height
- `hcl` – Hair color
- `ecl` – Eye color
- `pid` – Passport ID
- `cid` – Country ID

Data for each passport is stored as a sequence of `key:value` pairs separated by a space or newline, and each passport scan is separated by a blank line. A valid passport must contain all fields, except for the Country ID which is optional. For example,

```
ecl:gry pid:860033327 eyr:2020 hcl:#fffffd
byr:1937 iyr:2017 cid:147 hgt:183cm
```

is valid because all eight fields are present. However, the passport

```
iyr:2013 ecl:amb cid:350 eyr:2023 pid:028048884
hcl:#cfa07d byr:1929
```

is NOT valid because it is missing `hgt`, the Height field. The passport

```
hcl:#ae17e1 iyr:2013
eyr:2024
ecl:brn pid:760753108 byr:1931
hgt:179cm
```

IS valid because the only missing field is `cid`, the Country ID, which is optional.

Lab Assignment #10

Part A

Write a program named Lab10a_Act1a.py that reads in passport scans, counts and prints the number of valid passports, then writes the valid passport scans to a new file named Lab10a_Act1a_valid.txt. Format your program's output using the example shown below. Format your new file using the same format as the input file; write the data for each passport exactly as shown in the input file with one blank line between passports.

✓ Example output:

```
There are ??? valid passports
```

✓ Example Lab10a_Act1a_valid.txt file:

```
hgt:189cm byr:1987 pid:572028668 iyr:2014 hcl:#623a2f
eyr:2028 ecl:amb

pid:#e9bf38 hcl:z iyr:2029 byr:2028 ecl:#18f71a hgt:174in eyr:2036
```

…

Part B

The security line is now moving at lightning speed! But now the TSA agents are worried that some of the "valid" passports are actually invalid. It turns out that each of those required fields has rules about what values are valid.

- `byr` – Birth year – four digits, between 1920 and 2005, inclusive
- `iyr` – Issue year – four digits, between 2011 and 2021, inclusive
- `eyr` – Expiration year – four digits, between 2021 and 2031, inclusive
- `hgt` – Height – a number followed by either `cm` or `in`
  - If `cm`, the number must be between 150 and 193, inclusive
  - If `in`, the number must be between 59 and 76, inclusive
- `hcl` – Hair color – a `#` followed by exactly 6 characters (`0-9` or `a-f`)
- `ecl` – Eye color – exactly one of the following: `amb`, `blu`, `brn`, `gry`, `grn`, `hzl`, `oth`
- `pid` – Passport ID – a nine-digit number, including leading zeroes
- `cid` – Country ID – not required

Write a program named Lab10a_Act1b.py that reads in the same passport scan file, counts and prints the number of valid passports, then writes the valid passport scans to a new file named Lab10a_Act1b_valid.txt. Format your program's output and your new file using the same format as above.