Name: _____

Problem	Points	Score
1	50	
2	50	
Total	100	

Notes:

(1) The first step in this exam is to create a workspace in the following directory:

/data/courses/ece_1111/current/exams/ex_01

Your directory should be your last name all lowercase, followed by an underscore, following by your first name (e.g, "picone_joseph"). Set the permissions using "chmod u+rwx,g-rwx,o-rwx <lastname>" so only you have read and write permission to this directory. Create subdirectories within this directory: p01, p02, … You will use these for problems 1 and 2, … respectively. Put ALL your code in these directories. Do not touch your files after the exam is over.

(2) For this exam you are allowed to open a terminal window on your computer, you are allowed to web surf with Google, but you cannot use online chat, ChatGPT or other interactive services. Your code must be your own original work.

(50 pts) Problem No. 1:

Write a Python program in */p01* named *p01* that produces the same output as this command line:

```
X=<pid>; ps –ef | grep <pid> | awk '{print "cpu time = " $7}'
```

<*pid*> is a 6-digit process id.

Your Python program should take <*pid*> as an argument (*argv[1]*) and print the following:

```
ece-000_[1]: p01 <pid>
PID: <pid>  cpu time = hh:mm:ss
```

For example:

```
ece-000_[1]: p01 675992
PID: 675992  cpu time = 00:03:02
```

Note that 675992 is a process ID. Your output must be formatted exactly as show above. If the process ID doesn't exist, you should return an error message indicating an invalid PID was specified.

You cannot simply execute the command above in your Python program. You must use Python libraries and original Python code to produce the same output.

(50 pts) Problem No. 2:

Go into your *p02* directory and type:

```
ece-000_[1]: cat ../../picone_joseph/x.list
```

You should see the contents of the file *x.list*, a file in my exam directory.

Write a *Unix bash shellscript* that takes a filename as input and expands any environment variable in the filename. For example:

```
ece-000_[1]: JOE="ece_1111" ./p02 ../../picone_joseph/x.list
```

should output:

```
1: ece_1111/f001.txt
2: ece_1111/f002.txt
...
```

You will observe in *x.list* there is an environment variable "*$JOE*" that is part of each filename. Your script should get the value of *JOE* from the environment and substitute its actual value in each line.

The command line above sets the environment variable "*JOE*" to "ece_1111", and passes that value to the script. Your script should work for any value of *JOE*. For example:

```
ece-000_[1]: JOE="GO_EAGLES" ./p02 ../../picone_joseph/x.list
1: GO_EAGLES/f001.txt
2: GO_EAGLES/f002.txt
3: GO_EAGLES/f003.txt
```