

# Ph20 - Assignment 4

Mai H Nguyen

14 May 2018

## 1 Version control log

commit 859c7b321f64f7d8d9e3b97f2c73e9a85b8a11d8  
Merge: e1443c0 202c21a  
Author: Mai Nguyen <mhnguyen@caltech.edu>  
Date: Fri May 4 16:05:24 2018 -0700

Merge remote-tracking branch 'origin/master'

commit e1443c0511b4301f584fa43832f931cbd1522094  
Author: Mai Nguyen <mhnguyen@caltech.edu>  
Date: Fri May 4 16:03:25 2018 -0700

Increase time **for** appreciable lag

commit 2b7685a9bf962ab56e17277660a167c934a7e168  
Author: Mai Nguyen <mhnguyen@caltech.edu>  
Date: Fri May 4 16:00:33 2018 -0700

Remove pdf writeup

commit 9f5a4eb6cf45170866c5fbfe03c89ee35be4aee3  
Author: Mai Nguyen <mhnguyen@caltech.edu>  
Date: Fri May 4 16:00:05 2018 -0700

Remove redundant makefiles

commit e539c0fa21e1c1cc913f18a0c12214dd5f87043a  
Author: Mai Nguyen <mhnguyen@caltech.edu>  
Date: Fri May 4 15:59:32 2018 -0700

Remove unnecessary var files

commit 52373955d678893176a2a39d0c955c6a50fb0d75  
Author: Mai Nguyen <mhnguyen@caltech.edu>  
Date: Fri May 4 15:59:04 2018 -0700

Remove unnecessary var **file**

commit 202c21a1592755b285c844cb21a1d8f6d083f6b1  
Author: nsbhoangmai <38876996+nsbhoangmai@users.noreply.github.com>  
Date: Fri May 4 15:47:51 2018 -0700

Remove unnecessary **file**

```
commit 383a7ad791fd852e33420d961f4fecebd5bace6f
Author: nsbhoangmai <38876996+nsbhoangmai@users.noreply.github.com>
Date: Fri May 4 15:47:26 2018 -0700
```

Remove unnecessary **file**

```
commit 4e97e53f4abf9f691032e2403b6313804353145d
Author: nsbhoangmai <38876996+nsbhoangmai@users.noreply.github.com>
Date: Fri May 4 15:47:10 2018 -0700
```

Remove unnecessary **file**

```
commit a1271c63d5696eca8f3e77b373c507bb733e169a
Author: nsbhoangmai <38876996+nsbhoangmai@users.noreply.github.com>
Date: Fri May 4 15:47:00 2018 -0700
```

Remove unnecessary **file**

```
commit 3e452fe8b1745abd986c8dbaeb0391c3a9bad028
Author: nsbhoangmai <38876996+nsbhoangmai@users.noreply.github.com>
Date: Fri May 4 15:46:47 2018 -0700
```

Remove unnecessary **file**

```
commit 4c169b59d2eaa0677062d19548b225eb7c8af0bc
Author: Mai Nguyen <mhnguyen@caltech.edu>
Date: Fri May 4 15:44:41 2018 -0700
```

Add **all** Ph203 files

```
commit 2110ae92ea0ee4e82b0aaafe465135cf6174ad17
Author: nsbhoangmai <38876996+nsbhoangmai@users.noreply.github.com>
Date: Fri May 4 15:41:45 2018 -0700
```

Increase time **for** appreciable lag.

```
commit 9576953cd1522f305deed4836b625e6f8c16198
Author: Mai Nguyen <mhnguyen@caltech.edu>
Date: Wed May 2 13:21:46 2018 -0700
```

Initial commit

## 2 Makefile

```
PNG.FILES=$(patsubst %.py, %.png, $(wildcard A*.py))
```

```
.PHONY : clean all
```

```
all : $(PNG.FILES) log.txt complete.pdf
```

```
%.png : var.txt %.py
        python $*.py $< $@
```

```
log.txt :
        git log > $@
```

```
%.pdf : %.tex
```

```
pdflatex -shell-escape $^
```

```
.PHONY: clean
clean :
    rm -f *.png
    rm -f log.txt
    rm -f *.pdf
    rm -rf *.aux
```

### 3 Modification to source code

#### 3.1 Load code

```
def load_num(filename):
    """
    Load variables  $x_0$ ,  $v_0$ ,  $t$ ,  $h$  from a plain-text file and return these
    as a list.
    """
    with open(filename) as vari:
        A0 = vari.read().split()
        A1 = []
        for i in A0:
            i1 = float(i)
            A1.append(i1)
        return A1
```

#### 3.2 Modifications to existing codes to generate graphs

```
import sys
from load import *

def spring(input_file, output_file):
    [x0, v0, t, h] = load_num(input_file)

if __name__ == '__main__':
    input_file = sys.argv[1]
    output_file = sys.argv[2]
    spring(input_file, output_file)
```

### 4 Graphs generated by makefile

Command-line inputs for separate plots

```
$ make A311.png
$ make A313_trunc_t.png
$ make A313_trunc_x.png
$ make A315_comp.png
$ make A321_comp.png
$ make A323_comp.png
$ make A324.png
```

