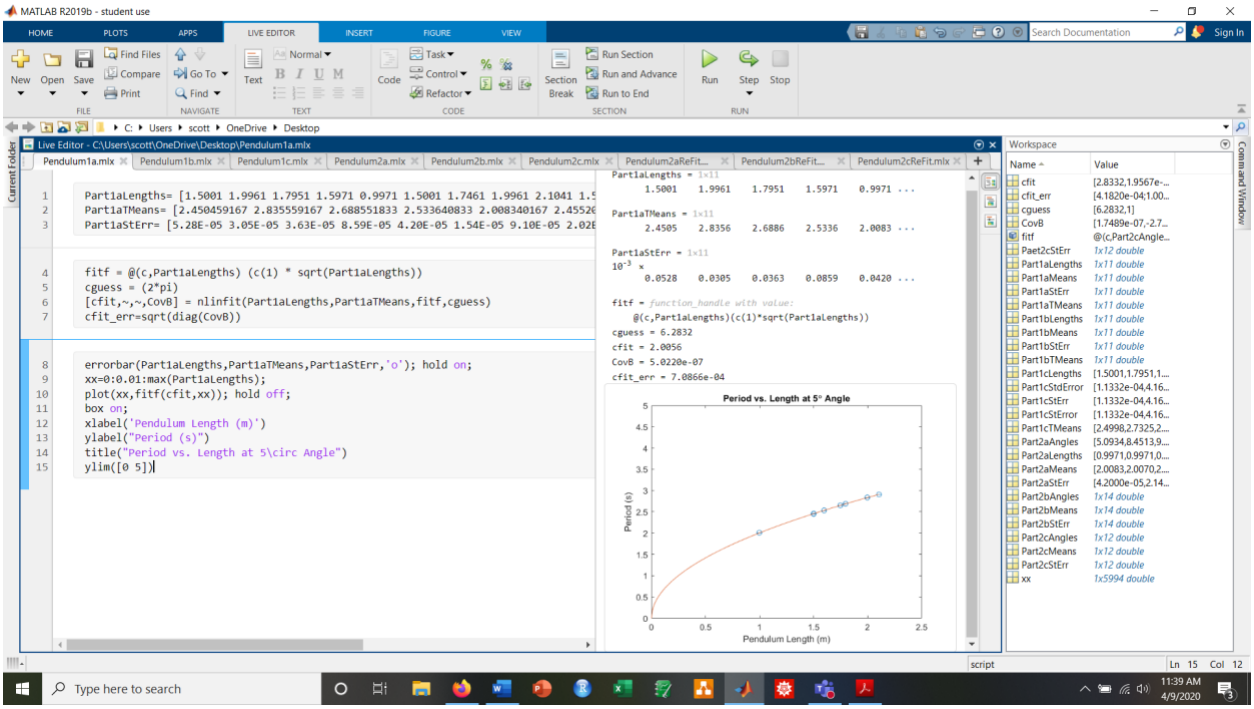
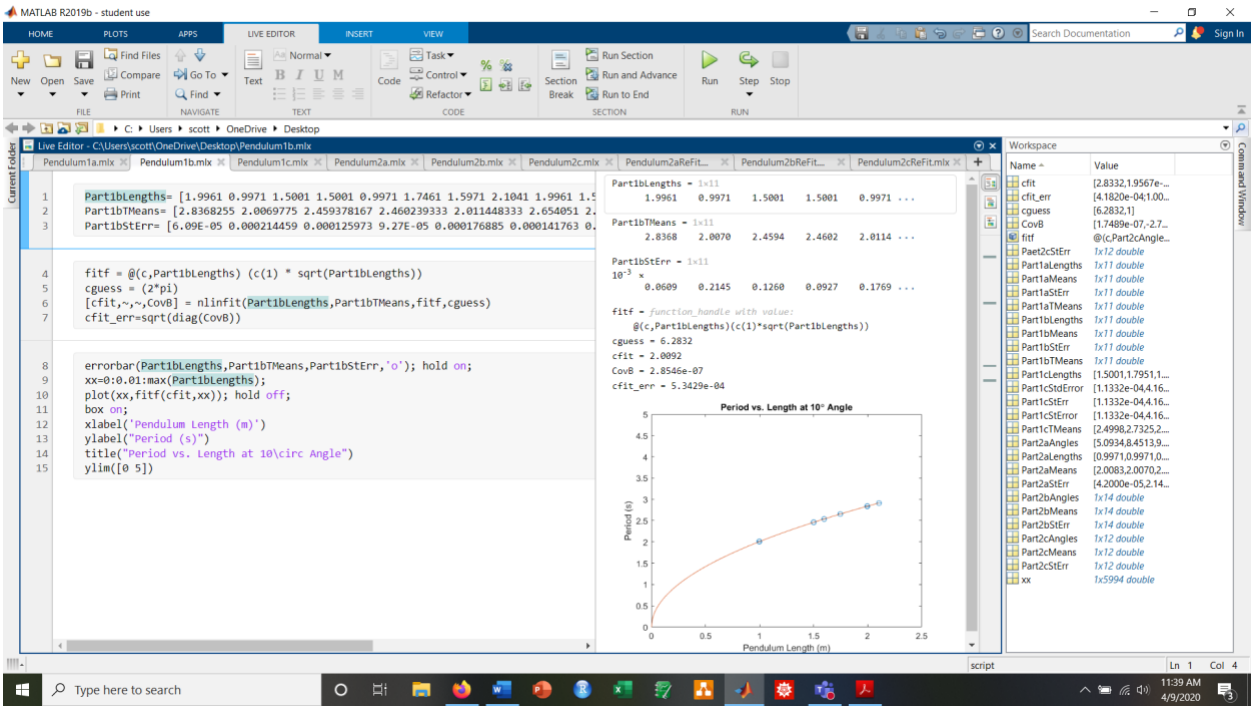
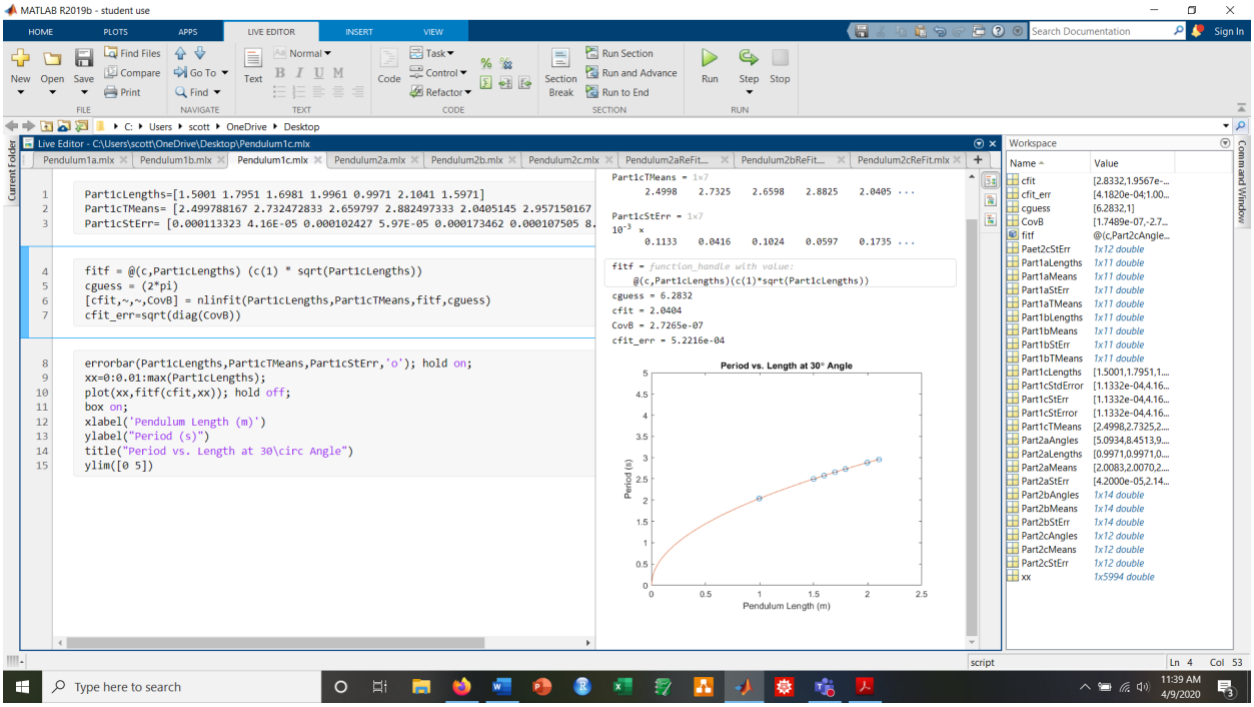
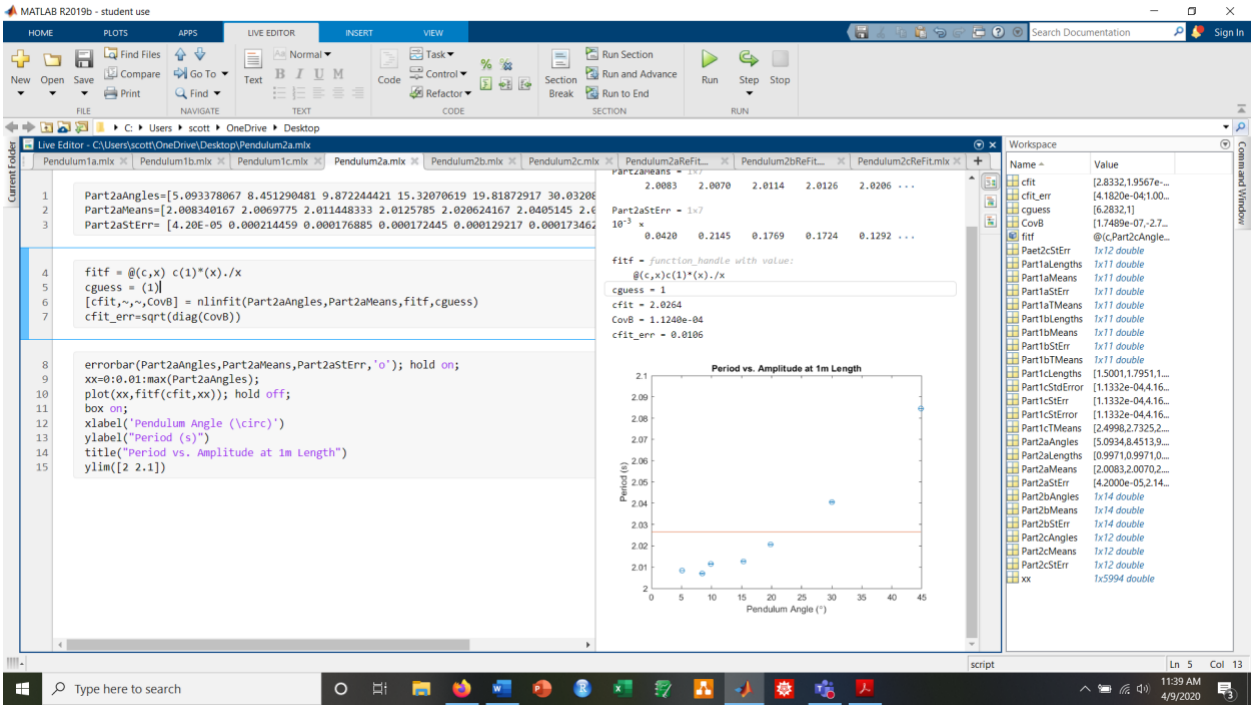

MATLAB R2019b - student use
Live Editor - C:\Users\scott\OneDrive\Desktop\Pendulum1a.mlx
Part1aLengths= [1.5001 1.9961 1.7951 1.5971 0.9971 1.5001 1.7461 1.9961 2.1041 1.5
Part1aTMeans= [2.450459167 2.835559167 2.688551833 2.533640833 2.008340167 2.4552
Part1aStErr= [5.28E-05 3.05E-05 3.63E-05 8.59E-05 4.20E-05 1.54E-05 9.10E-05 2.02
fitf = @(c,Part1aLengths) (c(1) * sqrt(Part1aLengths))
cguess = (2*pi)
[cfit,~,~,CovB] = nlinfit(Part1aLengths,Part1aTMeans,fitf,cguess)
cfit_err=sqrt(diag(CovB))
errorbar(Part1aLengths,Part1aTMeans,Part1aStErr,'o'); hold on;
xx=0:0.01:max(Part1aLengths);
plot(xx,fitf(cfit,xx)); hold off;
box on;
xlabel('Pendulum Length (m)')
ylabel("Period (s)")
title("Period vs. Length at 5\circ Angle")
ylim([0 5])
Part1aLengths = 1×11
1.5001 1.9961 1.7951 1.5971 0.9971 ...
Part1aTMeans = 1×11
2.4505 2.8356 2.6886 2.5336 2.0083 ...
Part1aStErr = 1×11
10^-3 ×
0.0528 0.0305 0.0363 0.0859 0.0420 ...
fitf = function_handle with value:
@(c,Part1aLengths)(c(1)*sqrt(Part1aLengths))
cguess = 6.2832
cfit = 2.0056
CovB = 5.0220e-07
cfit_err = 7.0866e-04
Period vs. Length at 5° Angle
Period (s)
Pendulum Length (m)


MATLAB R2019b - student use
Live Editor - C:\Users\scott\OneDrive\Desktop\Pendulum1b.mlx
Part1bLengths= [1.9961 0.9971 1.5001 1.5001 0.9971 1.7461 1.5971 2.1041 1.9961 1.5
Part1bTMeans= [2.8368255 2.0069775 2.459378167 2.460239333 2.011448333 2.654051 2.
Part1bStErr= [6.09E-05 0.000214459 0.000125973 9.27E-05 0.000176885 0.000141763 0.
fitf = @(c,Part1bLengths) (c(1) * sqrt(Part1bLengths))
cguess = (2*pi)
[cfit,~,~,CovB] = nlinfit(Part1bLengths,Part1bTMeans,fitf,cguess)
cfit_err=sqrt(diag(CovB))
errorbar(Part1bLengths,Part1bTMeans,Part1bStErr,'o'); hold on;
xx=0:0.01:max(Part1bLengths);
plot(xx,fitf(cfit,xx)); hold off;
box on;
xlabel('Pendulum Length (m)')
ylabel("Period (s)")
title("Period vs. Length at 10\circ Angle")
ylim([0 5])
Part1bLengths = 1×11
1.9961 0.9971 1.5001 1.5001 0.9971 ...
Part1bTMeans = 1×11
2.8368 2.0070 2.4594 2.4602 2.0114 ...
Part1bStErr = 1×11
10^-3 ×
0.0609 0.2145 0.1260 0.0927 0.1769 ...
fitf = function_handle with value:
@(c,Part1bLengths)(c(1)*sqrt(Part1bLengths))
cguess = 6.2832
cfit = 2.0092
CovB = 2.8546e-07
cfit_err = 5.3429e-04
Period vs. Length at 10° Angle
Period (s)
Pendulum Length (m)


MATLAB R2019b - student use
Live Editor - C:\Users\scott\OneDrive\Desktop\Pendulum1c.mlx
Part1cLengths=[1.5001 1.7951 1.6981 1.9961 0.9971 2.1041 1.5971]
Part1cTMeans= [2.499788167 2.732472833 2.659797 2.882497333 2.0405145 2.957150167
Part1cStErr= [0.000113323 4.16E-05 0.000102427 5.97E-05 0.000173462 0.000107505 8.
fitf = @(c,Part1cLengths) (c(1) * sqrt(Part1cLengths))
cguess = (2*pi)
[cfit,~,~,CovB] = nlinfit(Part1cLengths,Part1cTMeans,fitf,cguess)
cfit_err=sqrt(diag(CovB))
errorbar(Part1cLengths,Part1cTMeans,Part1cStErr,'o'); hold on;
xx=0:0.01:max(Part1cLengths);
plot(xx,fitf(cfit,xx)); hold off;
box on;
xlabel('Pendulum Length (m)')
ylabel("Period (s)")
title("Period vs. Length at 30\circ Angle")
ylim([0 5])
Part1cTMeans = 1x7
2.4998 2.7325 2.6598 2.8825 2.0405 ...
Part1cStErr = 1x7
10^-3 x
0.1133 0.0416 0.1024 0.0597 0.1735 ...
fitf = function_handle with value:
@(c,Part1cLengths)(c(1)*sqrt(Part1cLengths))
cguess = 6.2832
cfit = 2.0404
CovB = 2.7265e-07
cfit_err = 5.2216e-04
Period vs. Length at 30° Angle
Period (s)
Pendulum Length (m)


MATLAB R2019b - student use
Live Editor - C:\Users\scott\OneDrive\Desktop\Pendulum2a.mlx
Part2aAngles=[5.093378067 8.451290481 9.872244421 15.32070619 19.81872917 30.0320
Part2aMeans=[2.008340167 2.0069775 2.011448333 2.0125785 2.020624167 2.0405145 2.
Part2aStErr= [4.20E-05 0.000214459 0.000176885 0.000172445 0.000129217 0.000173462
fitf = @(c,x) c(1)*(x)./x
cguess = (1)
[cfit,~,~,CovB] = nlinfit(Part2aAngles,Part2aMeans,fitf,cguess)
cfit_err=sqrt(diag(CovB))
errorbar(Part2aAngles,Part2aMeans,Part2aStErr,'o'); hold on;
xx=0:0.01:max(Part2aAngles);
plot(xx,fitf(cfit,xx)); hold off;
box on;
xlabel('Pendulum Angle (\circ)')
ylabel("Period (s)")
title("Period vs. Amplitude at 1m Length")
ylim([2 2.1])
2.0083 2.0070 2.0114 2.0126 2.0206 ...
Part2aStErr = 1x7
10^-3 x
0.0420 0.2145 0.1769 0.1724 0.1292 ...
fitf = function_handle with value:
@(c,x)c(1)*(x)./x
cguess = 1
cfit = 2.0264
CovB = 1.1240e-04
cfit_err = 0.0106
Period vs. Amplitude at 1m Length
Period (s)
Pendulum Angle (°)

MATLAB R2019b - student use

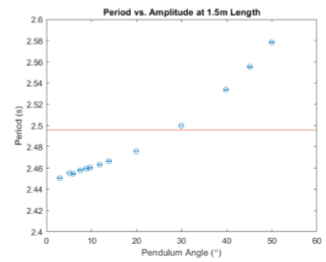
Live Editor - C:\Users\scott\OneDrive\Desktop\Pendulum2b.mlx

```
Part2bAngles= [2.94341016 5.099258116 5.888764556 7.508800081 8.838019013 9.660995
Part2bMeans=[2.450459167 2.455203167 2.454632833 2.4577615 2.459378167 2.46023933
Part2bStErr=[5.28E-05 1.54E-05 0.000781214 0.000232273 0.000125973 9.27E-05 0.0001
```

```
fitf = @(c,x) c(1)*(x)./x
cguess = (2*pi)
[cfit,~,~,CovB] = nlinfit(Part2bAngles,Part2bMeans,fitf,cguess)
cfit_err=sqrt(diag(CovB))
```

```
errorbar(Part2bAngles,Part2bMeans,Part2bStErr,'o'); hold on;
xx=0:0.01:max(Part2bAngles);
plot(xx,fitf(cfit,xx)); hold off;
box on;
xlabel('Pendulum Angle (\circ)')
ylabel("Period (s)")
title("Period vs. Amplitude at 1.5m Length")
ylim([2.4 2.6])
```

```
Part2bMeans = 1×14
    2.4505    2.4552    2.4546    2.4578    2.4594 ...

Part2bStErr = 1×14
10^-3 ×
    0.0528    0.0154    0.7812    0.2323    0.1260 ...

fitf = function_handle with value:
    @(c,x)c(1)*(x)./x
cguess = 6.2832
cfit = 2.4958
CovB = 2.3071e-04
cfit_err = 0.0152
```



MATLAB R2019b - student use

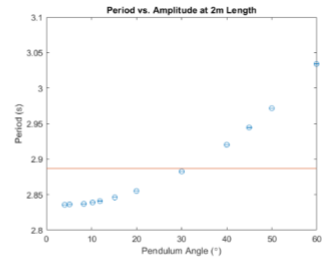
Live Editor - C:\Users\scott\OneDrive\Desktop\Pendulum2c.mlx

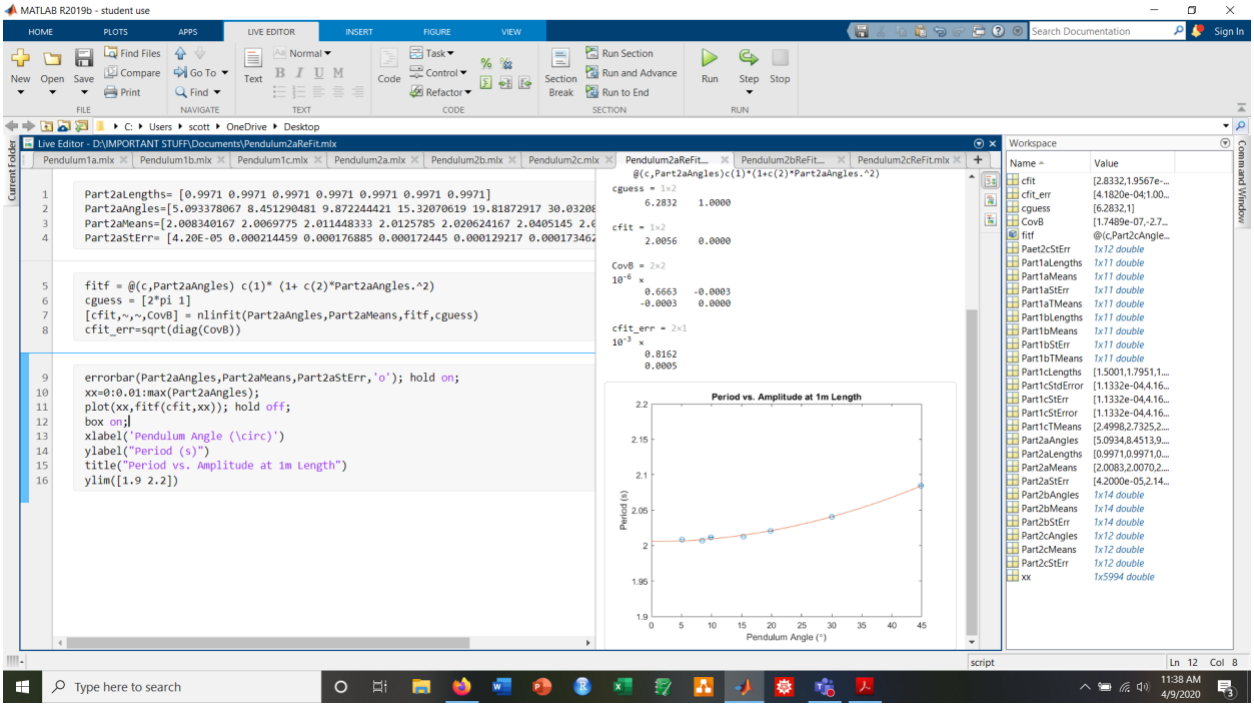
```
Part2cAngles=[4.040160549 5.111079568 8.285367101 10.23236262 11.86682092 15.1579
Part2cMeans= [2.835559167 2.8361442 2.8368255 2.838848833 2.840649167 2.845827833
Part2cStErr=[3.05E-05 2.02E-05 6.09E-05 9.07E-05 6.86E-05 9.28E-05 0.000107887 5.
```

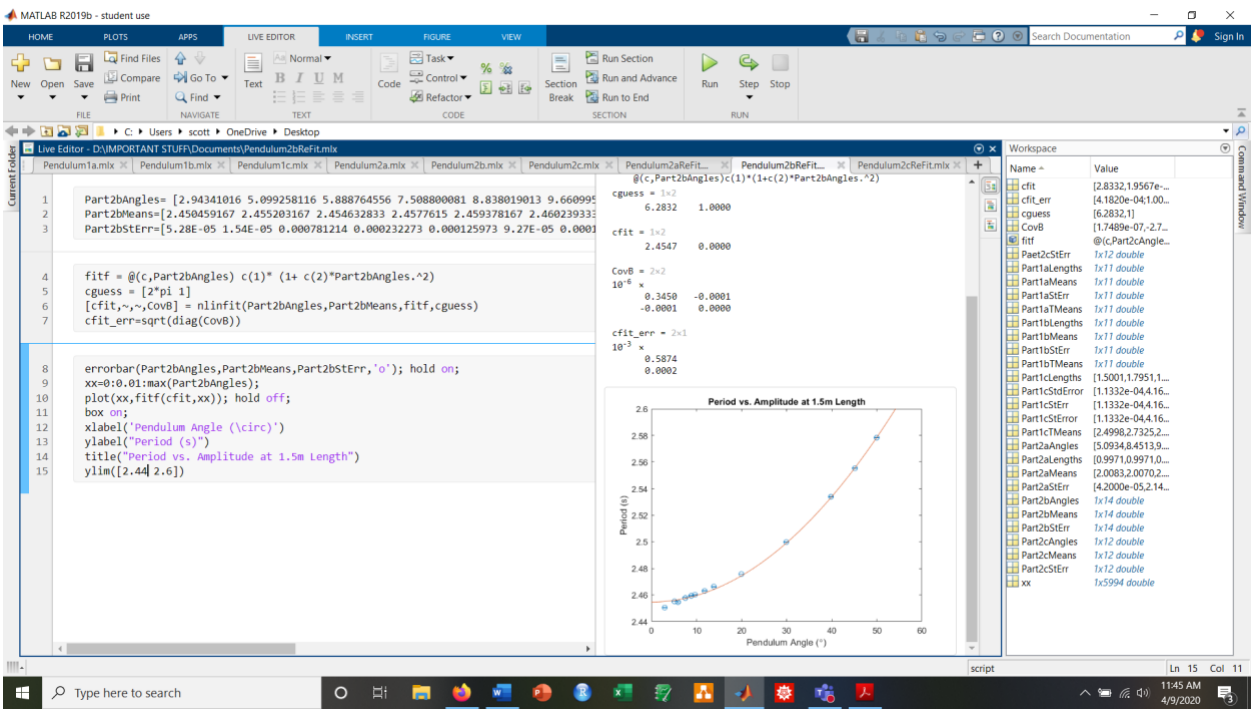
```
fitf = @(c,x) c(1)*(x)./x
cguess = (2*pi)
[cfit,~,~,CovB] = nlinfit(Part2cAngles,Part2cMeans,fitf,cguess)
cfit_err=sqrt(diag(CovB))
```

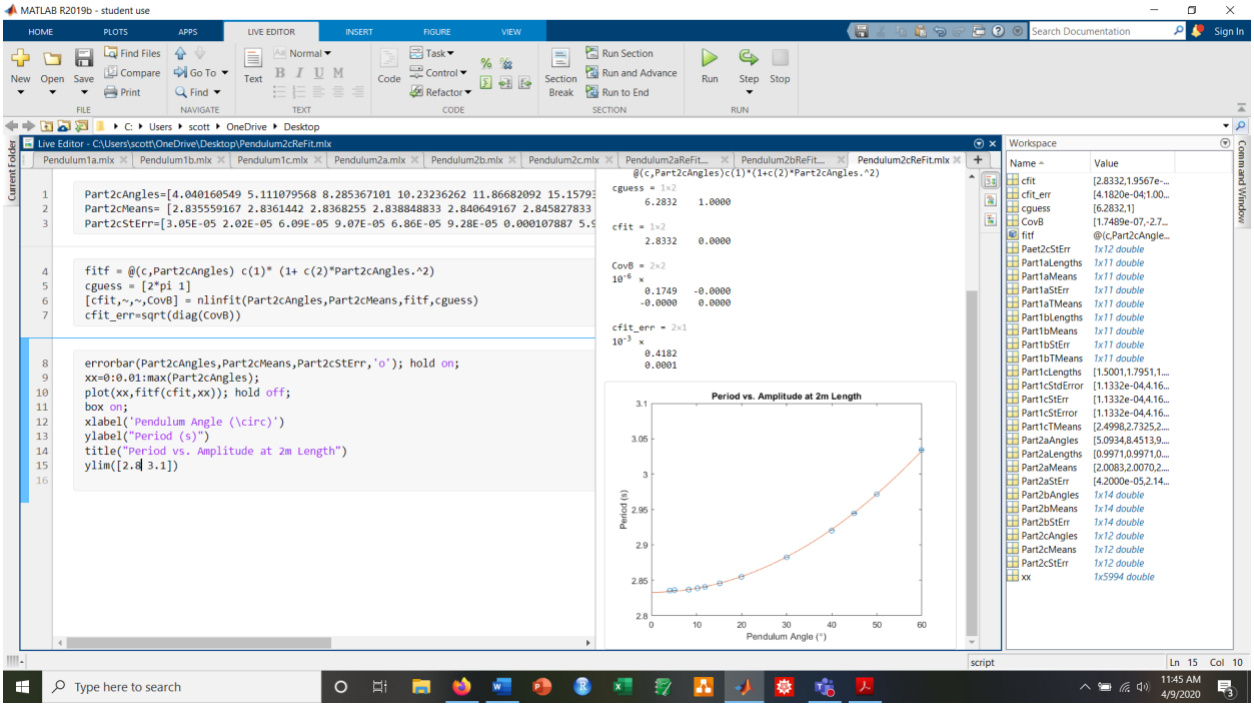
```
errorbar(Part2cAngles,Part2cMeans,Part2cStErr,'o'); hold on;
xx=0:0.01:max(Part2cAngles);
plot(xx,fitf(cfit,xx)); hold off;
box on;
xlabel('Pendulum Angle (\circ)')
ylabel("Period (s)")
title("Period vs. Amplitude at 2m Length")
ylim([2.8 3.1])
```

```
Part2cMeans = 1×12
    2.8356    2.8361    2.8368    2.8388    2.8406 ...

Part2cStErr = 1×12
10^-3 ×
    0.0305    0.0202    0.0609    0.0907    0.0686 ...

fitf = function_handle with value:
    @(c,x)c(1)*(x)./x
cguess = 6.2832
cfit = 2.8868
CovB = 3.6462e-04
cfit_err = 0.0191
```




MATLAB R2019b - student use
Live Editor - D:\IMPORTANT STUFF\Documents\Pendulum2aReFit.mlx
Part2aLengths= [0.9971 0.9971 0.9971 0.9971 0.9971 0.9971 0.9971]
Part2aAngles=[5.093378067 8.451290481 9.872244421 15.32070619 19.81872917 30.0320
Part2aMeans=[2.008340167 2.0069775 2.011448333 2.0125785 2.020624167 2.0405145 2.0
Part2aStErr= [4.20E-05 0.000214459 0.000176885 0.000172445 0.000129217 0.000173462
fitf = @(c,Part2aAngles) c(1)* (1+ c(2)*Part2aAngles.^2)
cguess = [2*pi 1]
[cfit,~,~,CovB] = nlinfit(Part2aAngles,Part2aMeans,fitf,cguess)
cfit_err=sqrt(diag(CovB))
errorbar(Part2aAngles,Part2aMeans,Part2aStErr,'o'); hold on;
xx=0:0.01:max(Part2aAngles);
plot(xx,fitf(cfit,xx)); hold off;
box on;
xlabel('Pendulum Angle (\circ)')
ylabel("Period (s)")
title("Period vs. Amplitude at 1m Length")
ylim([1.9 2.2])
Period vs. Amplitude at 1m Length
Period (s)
Pendulum Angle (°)


MATLAB R2019b - student use
Live Editor - D:\IMPORTANT STUFF\Documents\Pendulum2bReFit.mlx
Part2bAngles= [2.94341016 5.099258116 5.888764556 7.508800081 8.838019013 9.660995
Part2bMeans=[2.450459167 2.455203167 2.454632833 2.4577615 2.459378167 2.46023933
Part2bStErr=[5.28E-05 1.54E-05 0.000781214 0.000232273 0.000125973 9.27E-05 0.0001
fitf = @(c,Part2bAngles) c(1)* (1+ c(2)*Part2bAngles.^2)
cguess = [2*pi 1]
[cfit,~,~,CovB] = nlinfit(Part2bAngles,Part2bMeans,fitf,cguess)
cfit_err=sqrt(diag(CovB))
errorbar(Part2bAngles,Part2bMeans,Part2bStErr,'o'); hold on;
xx=0:0.01:max(Part2bAngles);
plot(xx,fitf(cfit,xx)); hold off;
box on;
xlabel('Pendulum Angle (\circ)')
ylabel("Period (s)")
title("Period vs. Amplitude at 1.5m Length")
ylim([2.44 2.6])
Period vs. Amplitude at 1.5m Length
Period (s)
Pendulum Angle (°)


MATLAB R2019b - student use
Live Editor - C:\Users\scott\OneDrive\Desktop\Pendulum2cReFit.mlx
Part2cAngles=[4.040160549 5.111079568 8.285367101 10.23236262 11.86682092 15.1579
Part2cMeans= [2.835559167 2.8361442 2.8368255 2.838848833 2.840649167 2.845827833
Part2cStErr=[3.05E-05 2.02E-05 6.09E-05 9.07E-05 6.86E-05 9.28E-05 0.000107887 5.9
fitf = @(c,Part2cAngles) c(1)* (1+ c(2)*Part2cAngles.^2)
cguess = [2*pi 1]
[cfit,~,~,CovB] = nlinfit(Part2cAngles,Part2cMeans,fitf,cguess)
cfit_err=sqrt(diag(CovB))
errorbar(Part2cAngles,Part2cMeans,Part2cStErr,'o'); hold on;
xx=0:0.01:max(Part2cAngles);
plot(xx,fitf(cfit,xx)); hold off;
box on;
xlabel('Pendulum Angle (\circ)')
ylabel("Period (s)")
title("Period vs. Amplitude at 2m Length")
ylim([2.8 3.1])
Period vs. Amplitude at 2m Length
Period (s)
Pendulum Angle (°)
Workspace