In [2]:

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import numpy as np
import matplotlib.mlab as mlab
import matplotlib.pyplot as plt
import matplotlib.patches as patch

#Tyler finch, Alaric hartsock Hannah, Luke
timedata = [16.76,18.8,17.7,18.5,17.5,17.8,16.5,18.2]
t2 = [1.33,1.19,1.24,1.21,1.40,1.20]

speeddata = []
for value in timedata:
    velocity = 10 / value
    speeddata.append(velocity)




speedmean = np.mean(t2)
speedsigma = np.std(t2)
variability = 100.*speedsigma/speedmean
# 2 ways to print out and check your data
print("Our average speed is %.3f m/s with a standard deviation of %.3f." % (speedme
an,speedsigma))
print("Our variability is %.2f%%" % variability)


# actual model parameters - slope and intercept
slope2ave = speedmean
slope2plus = speedmean+speedsigma
slope2minus = speedmean-speedsigma
modelint = 0.
halfwidth = .25 # half the width of the cart

# range of t values -- choose lower and upper limits of range
model2 = np.linspace(0.,20.,20)

# generate y values from model
model3avey = slope2ave*model2 + modelint

# these are the locations of the front and back of cart
model2fronty = model3avey + halfwidth
model2backy = model3avey - halfwidth

# these are the likely fast and slow models from my variability
model2plusy = slope2plus*model2 + modelint
model2minusy = slope2minus*model2 + modelint




speedmean = np.mean(speeddata)
speedsigma = np.std(speeddata)
variability = 100.*speedsigma/speedmean
```

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# 2 ways to print out and check your data
print("Our average speed is %.3f m/s with a standard deviation of %.3f." % (speedme
an,speedsigma))
print("Our variability is %.2f%%" % variability)


# actual model parameters - slope and intercept
slope1ave = speedmean
slope1plus = speedmean+speedsigma
slope1minus = speedmean-speedsigma
modelint = 0.
halfwidth = .25 # half the width of the cart

# range of t values -- choose lower and upper limits of range
modelx = np.linspace(0.,20.,20)

# generate y values from model
model1avey = slope1ave*modelx + modelint

# these are the locations of the front and back of cart
model1fronty = model1avey + halfwidth
model1backy = model1avey - halfwidth

# these are the likely fast and slow models from my variability
model1plusy = slope1plus*modelx + modelint
model1minusy = slope1minus*modelx + modelint




time1 = 0
xpos = -9
fig2, ax2 = plt.subplots()

ax2.plot(modelx + time1, model3avey+ xpos, color = 'green', linestyle = '-', linewi
dth = 2., label = "mean")
ax2.plot(modelx + time1, model2plusy+ xpos, color = 'red', linestyle = ':', linewid
th = 1., label = "plus")
ax2.plot(modelx + time1, model2minusy+ xpos, color = 'red', linestyle = ':', linewi
dth = 1., label = "minus")

ax2.plot(modelx + time1, model2fronty+ xpos, color = 'cyan', linestyle = '-', linew
idth = .5, label = "front")
ax2.plot(modelx + time1, model2backy+ xpos, color = 'cyan', linestyle = '-', linewi
dth = .5, label = "back")

ax2.set(xlabel='time (s)', ylabel='position (m)',
       title='How my cart rolls')



time2 = 0
ypos = 1


ax2.plot(model2 + time2, model1avey+ ypos, color = 'blue', linestyle = '-', linewid
th = 2., label = "mean")
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ax2.plot(model2 + time2, model1plusy+ypos, color = 'red', linestyle = ':', linewidt
h = 1., label = "plus")
ax2.plot(model2 + time2, model1minusy+ypos, color = 'red', linestyle = ':', linewid
th = 1., label = "minus")

ax2.plot(model2 + time2, model1fronty+ypos, color = 'cyan', linestyle = '-', linewi
dth = .5, label = "front")
ax2.plot(model2 + time2, model1backy+ypos, color = 'cyan', linestyle = '-', linewid
th = .5, label = "back")


ax2.grid()
fig2.set_size_inches(8, 6)
plt.legend(loc= 4)
plt.show()
```
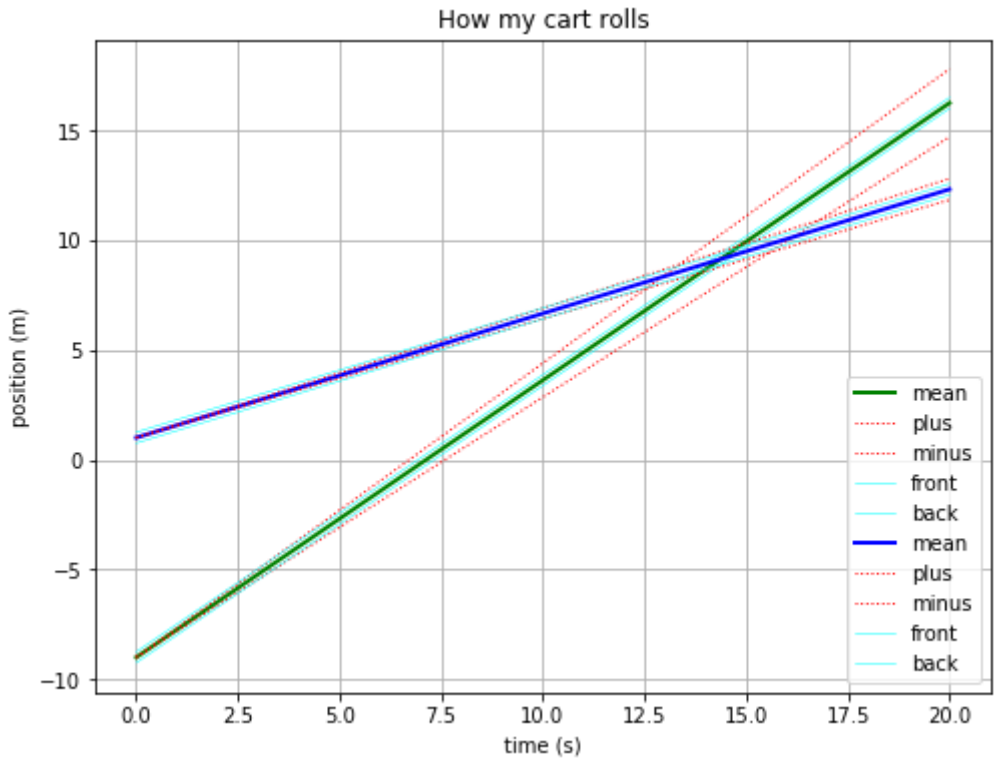

```
Our average speed is 1.262 m/s with a standard deviation of 0.077.
Our variability is 6.13%
Our average speed is 0.565 m/s with a standard deviation of 0.024.
Our variability is 4.28%
```



In [ ]: