**Python**

**Create dataframe (table)**

frame = pd.DataFrame({'c\_merged\_firm' : c\_after\_merger, 'output\_non\_merging\_firm' : q1\_after\_merger, 'output\_merged\_firm' : q2\_after\_merger})

df\_after\_merger = frame[['c\_merged\_firm', 'output\_non\_merging\_firm', 'output\_merged\_firm']]

df\_after\_merger.head()

**Graph (plt.plot())**

range\_x = np.arange(1,31,1)

plt.plot(range\_x, [outcome(n,0.9)[0] for n in range\_x], color=’blue’) #1 unknown variable (n)

plt.title('Payoff to player 1, continuous') #And outcome for player 1 [0]

plt.xlabel('Length of the game')

plt.show()

**Graph (scatter)**

plt.scatter(x,y, color=’red’)

plt.vlines(x-value,0,20, color=’green’) #For horizontal lines

plt.legend(['P0', 'After merging'])

plt.show()

**Optimize (scipy package)**

optimize.fsolve(lambda q: fixed\_point(q,[0.2,0.3]), initial\_guess) #See Week 3/week\_3, always min()

**R**

**Install packages**

install.packages('maptools', repos='http://cran.us.r-project.org')

**Reading files + factor to numeric**

From factor to numeric (in df): var <- read.csv2(“../Sourcedata/nld\_pc4\_locations.csv”) %>%  
mutate(X = as.numeric(as.character(X))) %>% #See Week 5/Readdata  
mutate(Y = as.numeric(as.character(Y)))

Use: str(var) to determine form (int/num/char etc.)

**Join**

var <- inner\_join(df1, df2, by = 'PC4') #See Week 5/Merging on laptop

**Gather / Spread**

df2 <- df1 %>%

gather(Key, Value) #Always (Key (=name), Value (=name)

#Also: data2 <-gather(data1, Year, Value, Year\_1:Year\_4) %>% #3 kolommen, df=data1

arrange(ID)

data1a

data3 <- data2 %>%

spread(Year, Value)

print(data3)

**ggplot (box/bar/point/smooth (lm))**

ggplot(data=df1, aes(x=V1, y=response)) +

geom\_point() +

geom\_smooth(method='lm', se=TRUE, color='red') + #For linear regression model

theme\_classic() +

xlab('Predictor')

**Thematicmaps, different colors**

AddMapLayer(MapPlot(), map\_municipal) %>%

AddPointsLayer(var, columnNameColor='DENOMINATIE') #Different colors for each different ‘DEN…’