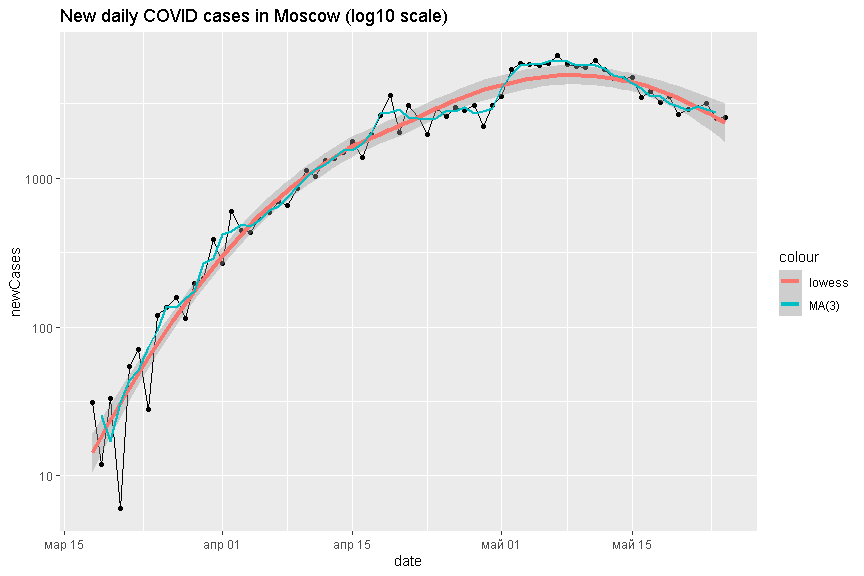
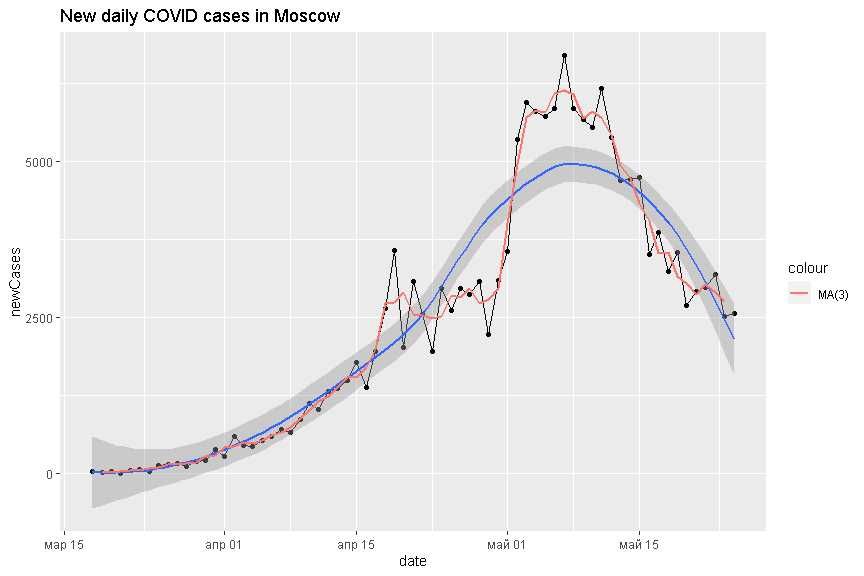
COVID in Мoscow

## [1] "CovidMoscowDB was NOT updated"

## Общий фит



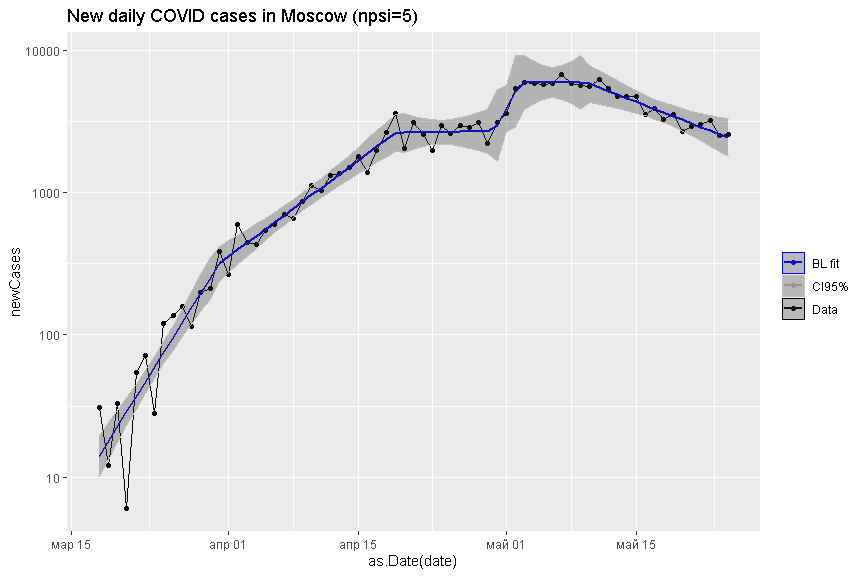
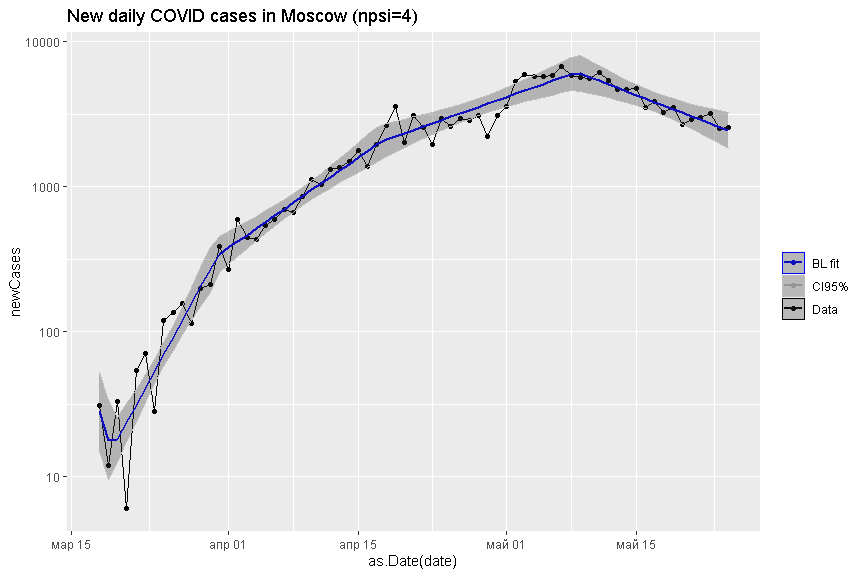
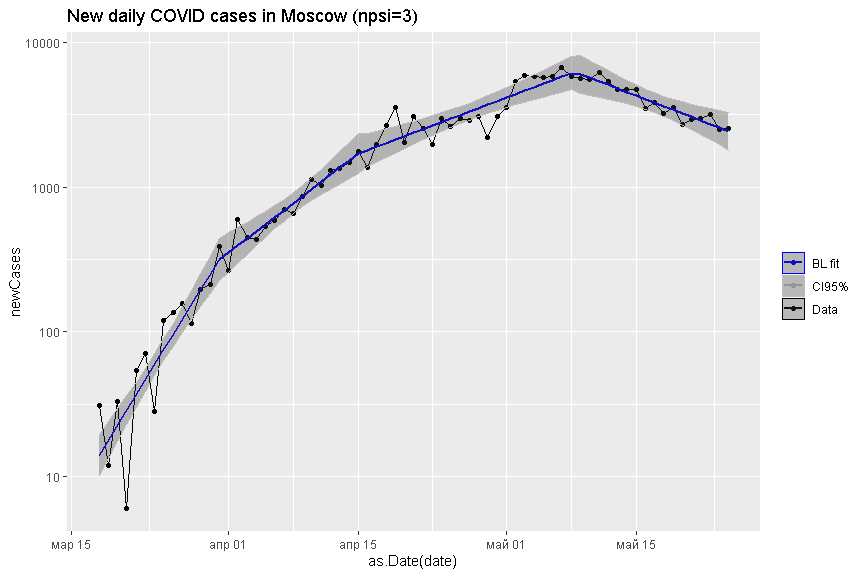
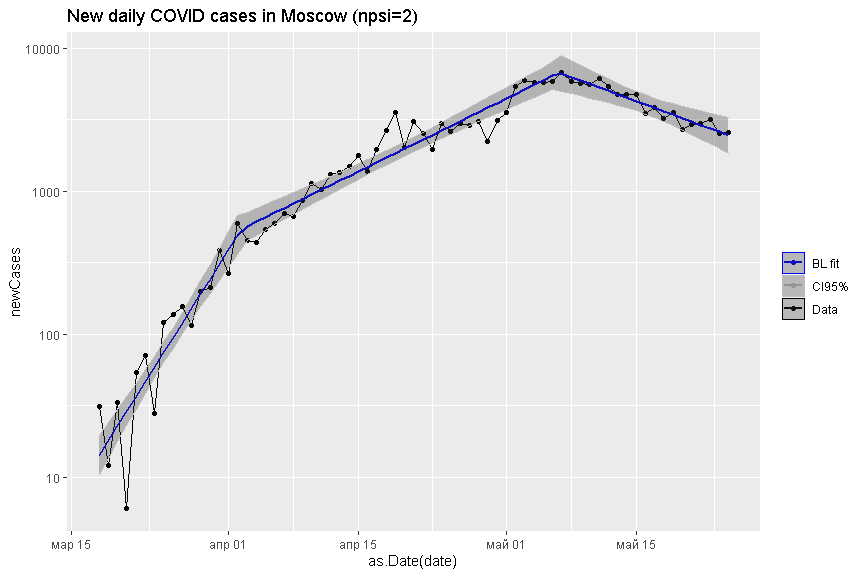
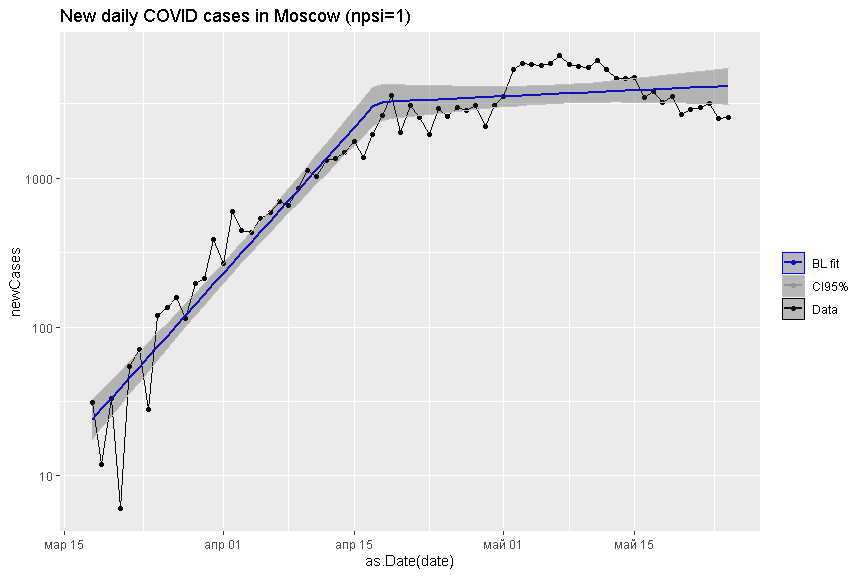


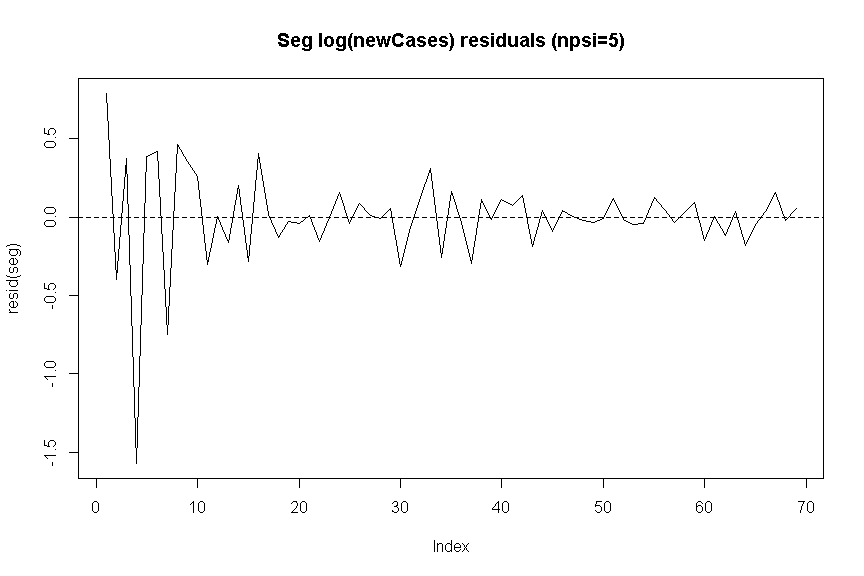
## One line

##   
## Call:  
## lm(formula = log(newCases) ~ days\_from\_beg, data = CovidMoscow)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -3.0109 -0.5704 0.3664 0.6230 1.2902   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 4.58676 0.20962 21.88 <2e-16 \*\*\*  
## days\_from\_beg 0.07198 0.00532 13.53 <2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.8801 on 67 degrees of freedom  
## Multiple R-squared: 0.7321, Adjusted R-squared: 0.7281   
## F-statistic: 183.1 on 1 and 67 DF, p-value: < 2.2e-16

## Segmented

##   
## -------------- N. Breaking points = 1 =-------------  
##   
## \*\*\*Regression Model with Segmented Relationship(s)\*\*\*  
##   
## Call:   
## segmented.lm(obj = lm\_msk0, psi = start\_psi[1:npt])  
##   
## Estimated Break-Point(s):  
## Est. St.Err  
## psi1.days\_from\_beg 30.416 1.366  
##   
## Meaningful coefficients of the linear terms:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 3.175955 0.153035 20.75 <2e-16 \*\*\*  
## days\_from\_beg 0.161241 0.008763 18.40 <2e-16 \*\*\*  
## U1.days\_from\_beg -0.154530 0.010884 -14.20 NA   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4364 on 65 degrees of freedom  
## Multiple R-Squared: 0.9361, Adjusted R-squared: 0.9331   
##   
## Convergence attained in 3 iter. (rel. change 0)  
##   
## -------------- N. Breaking points = 2 =-------------  
##   
## \*\*\*Regression Model with Segmented Relationship(s)\*\*\*  
##   
## Call:   
## segmented.lm(obj = lm\_msk0, psi = start\_psi[1:npt])  
##   
## Estimated Break-Point(s):  
## Est. St.Err  
## psi1.days\_from\_beg 15.408 1.244  
## psi2.days\_from\_beg 49.708 1.481  
##   
## Meaningful coefficients of the linear terms:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 2.65796 0.15988 16.625 <2e-16 \*\*\*  
## days\_from\_beg 0.23609 0.01816 13.000 <2e-16 \*\*\*  
## U1.days\_from\_beg -0.16261 0.01908 -8.522 NA   
## U2.days\_from\_beg -0.12869 0.01520 -8.467 NA   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.3349 on 63 degrees of freedom  
## Multiple R-Squared: 0.9635, Adjusted R-squared: 0.9606   
##   
## Convergence attained in 3 iter. (rel. change 0)  
##   
## -------------- N. Breaking points = 3 =-------------  
##   
## \*\*\*Regression Model with Segmented Relationship(s)\*\*\*  
##   
## Call:   
## segmented.lm(obj = lm\_msk0, psi = start\_psi[1:npt])  
##   
## Estimated Break-Point(s):  
## Est. St.Err  
## psi1.days\_from\_beg 13.000 1.906  
## psi2.days\_from\_beg 28.021 3.757  
## psi3.days\_from\_beg 51.361 1.867  
##   
## Meaningful coefficients of the linear terms:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 2.64534 0.16513 16.019 < 2e-16 \*\*\*  
## days\_from\_beg 0.23925 0.02159 11.081 3.03e-16 \*\*\*  
## U1.days\_from\_beg -0.12698 0.02907 -4.369 NA   
## U2.days\_from\_beg -0.05670 0.02199 -2.579 NA   
## U3.days\_from\_beg -0.11206 0.01910 -5.868 NA   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.3256 on 61 degrees of freedom  
## Multiple R-Squared: 0.9666, Adjusted R-squared: 0.9628   
##   
## Convergence attained in 9 iter. (rel. change 8.6246e-06)  
##   
## -------------- N. Breaking points = 4 =-------------  
##   
## \*\*\*Regression Model with Segmented Relationship(s)\*\*\*  
##   
## Call:   
## segmented.lm(obj = lm\_msk0, psi = start\_psi[1:npt])  
##   
## Estimated Break-Point(s):  
## Est. St.Err  
## psi1.days\_from\_beg 1.360 0.666  
## psi2.days\_from\_beg 12.850 1.462  
## psi3.days\_from\_beg 30.507 4.022  
## psi4.days\_from\_beg 51.606 1.876  
##   
## Meaningful coefficients of the linear terms:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 3.33004 0.31328 10.630 2.48e-15 \*\*\*  
## days\_from\_beg -0.45244 0.44304 -1.021 0.311   
## U1.days\_from\_beg 0.72243 0.44404 1.627 NA   
## U2.days\_from\_beg -0.16764 0.03309 -5.067 NA   
## U3.days\_from\_beg -0.05009 0.01817 -2.758 NA   
## U4.days\_from\_beg -0.10890 0.01918 -5.677 NA   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.3133 on 59 degrees of freedom  
## Multiple R-Squared: 0.9701, Adjusted R-squared: 0.9655   
##   
## Convergence \*not\* attained in 39 iter. (rel. change -0.026608)  
##   
## -------------- N. Breaking points = 5 =-------------  
##   
## \*\*\*Regression Model with Segmented Relationship(s)\*\*\*  
##   
## Call:   
## segmented.lm(obj = lm\_msk0, psi = start\_psi[1:npt])  
##   
## Estimated Break-Point(s):  
## Est. St.Err  
## psi1.days\_from\_beg 13.000 1.831  
## psi2.days\_from\_beg 32.000 2.175  
## psi3.days\_from\_beg 42.645 1.499  
## psi4.days\_from\_beg 45.514 1.674  
## psi5.days\_from\_beg 52.495 4.919  
##   
## Meaningful coefficients of the linear terms:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 2.64466 0.16743 15.796 < 2e-16 \*\*\*  
## days\_from\_beg 0.23942 0.02368 10.112 2.5e-14 \*\*\*  
## U1.days\_from\_beg -0.12834 0.02720 -4.719 NA   
## U2.days\_from\_beg -0.10853 0.03327 -3.262 NA   
## U3.days\_from\_beg 0.27213 0.22792 1.194 NA   
## U4.days\_from\_beg -0.27354 0.23380 -1.170 NA   
## U5.days\_from\_beg -0.05917 0.06280 -0.942 NA   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.3194 on 57 degrees of freedom  
## Multiple R-Squared: 0.97, Adjusted R-squared: 0.9642   
##   
## Convergence attained in 9 iter. (rel. change 3.5943e-06)

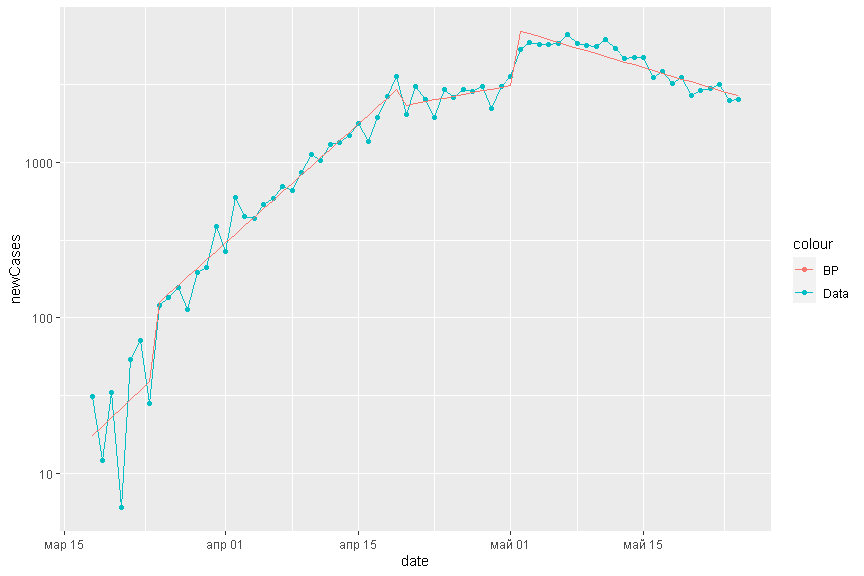




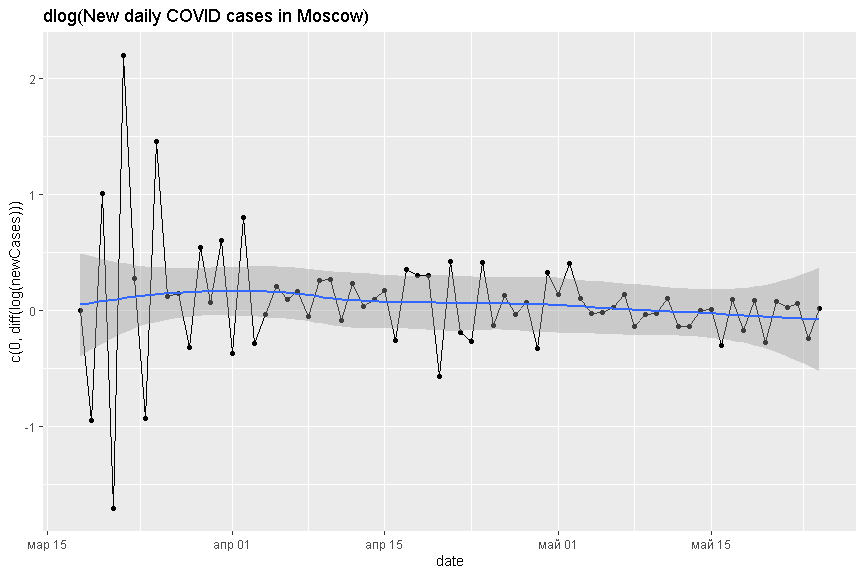
##   
## -------------- N. Breaking points = 1 =-------------  
## Slopes  
## $days\_from\_beg  
## Est. St.Err. t value CI(95%).l CI(95%).u  
## slope1 0.1612400 0.0087627 18.4010 0.1437400 0.178740  
## slope2 0.0067111 0.0064555 1.0396 -0.0061815 0.019604  
##   
## Doubling of cases:  
## slope1 slope2   
## 4.298854 103.283691   
##   
## -------------- N. Breaking points = 2 =-------------  
## Slopes  
## $days\_from\_beg  
## Est. St.Err. t value CI(95%).l CI(95%).u  
## slope1 0.236090 0.0181610 13.0000 0.199790 0.272380  
## slope2 0.073471 0.0058538 12.5510 0.061773 0.085169  
## slope3 -0.055216 0.0140260 -3.9366 -0.083245 -0.027186  
##   
## Doubling of cases:  
## slope1 slope2 slope3   
## 2.935945 9.434296 -12.553375   
##   
## -------------- N. Breaking points = 3 =-------------  
## Slopes  
## $days\_from\_beg  
## Est. St.Err. t value CI(95%).l CI(95%).u  
## slope1 0.239250 0.021590 11.0810 0.196080 0.282420  
## slope2 0.112270 0.019461 5.7687 0.073350 0.151180  
## slope3 0.055564 0.010237 5.4280 0.035095 0.076034  
## slope4 -0.056493 0.016122 -3.5041 -0.088731 -0.024255  
##   
## Doubling of cases:  
## slope1 slope2 slope3 slope4   
## 2.897167 6.173931 12.474753 -12.269612   
##   
## -------------- N. Breaking points = 4 =-------------  
## Slopes  
## $days\_from\_beg  
## Est. St.Err. t value CI(95%).l CI(95%).u  
## slope1 -0.452440 0.443040 -1.0212 -1.339000 0.434080  
## slope2 0.269990 0.029870 9.0390 0.210220 0.329760  
## slope3 0.102350 0.014232 7.1914 0.073872 0.130830  
## slope4 0.052256 0.011290 4.6287 0.029666 0.074847  
## slope5 -0.056641 0.015509 -3.6520 -0.087675 -0.025607  
##   
## Doubling of cases:  
## slope1 slope2 slope3 slope4 slope5   
## -1.532020 2.567307 6.772322 13.264452 -12.237552   
##   
## -------------- N. Breaking points = 5 =-------------  
## Slopes  
## $days\_from\_beg  
## Est. St.Err. t value CI(95%).l CI(95%).u  
## slope1 0.2394200 0.023678 10.112000 0.192000 0.286830  
## slope2 0.1110800 0.013379 8.302400 0.084289 0.137870  
## slope3 0.0025551 0.030457 0.083893 -0.058433 0.063544  
## slope4 0.2746900 0.225870 1.216100 -0.177610 0.726990  
## slope5 0.0011446 0.060367 0.018961 -0.119740 0.122030  
## slope6 -0.0580240 0.017324 -3.349400 -0.092714 -0.023334  
##   
## Doubling of cases:  
## slope1 slope2 slope3 slope4 slope5 slope6   
## 2.895110 6.240072 271.279864 2.523380 605.580273 -11.945870

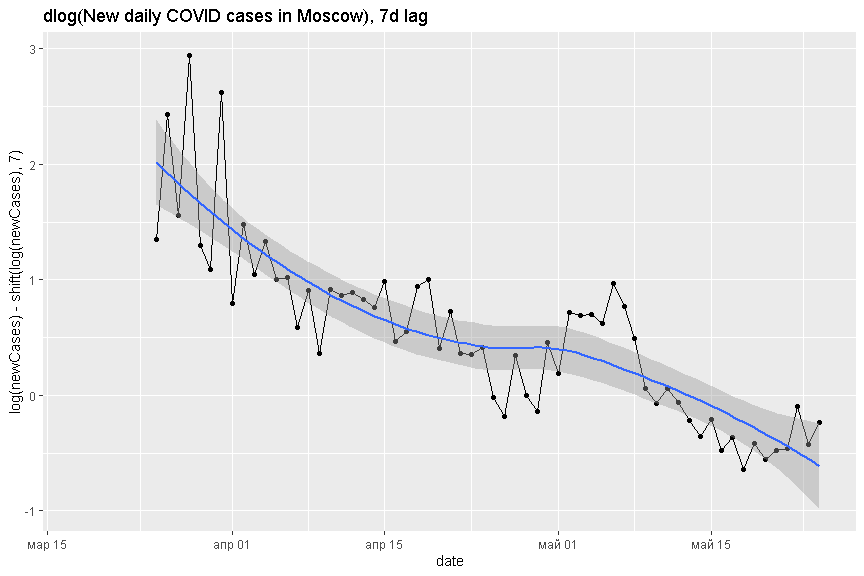
## Struct change

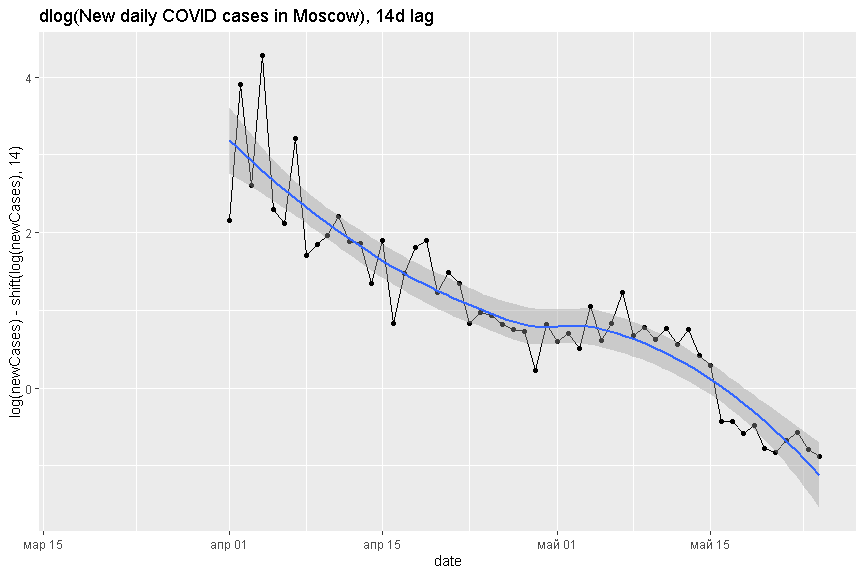
##   
## Optimal 4-segment partition:   
##   
## Call:  
## breakpoints.formula(formula = log(newCases) ~ days\_from\_beg,   
## h = 7/CovidMoscow[, .N], data = CovidMoscow)  
##   
## Breakpoints at observation number:  
## 7 33 45   
##   
## Corresponding to breakdates:  
## 0.1014493 0.4782609 0.6521739



# Дифференциалы

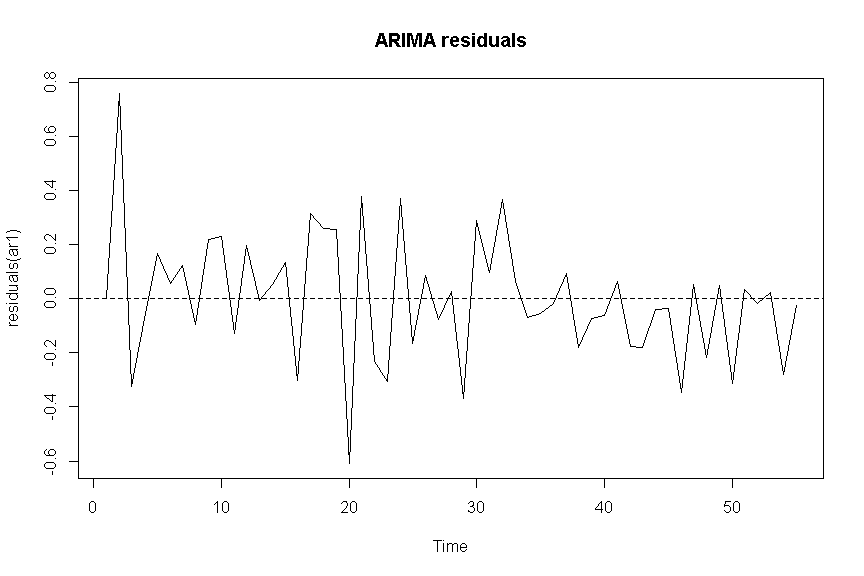




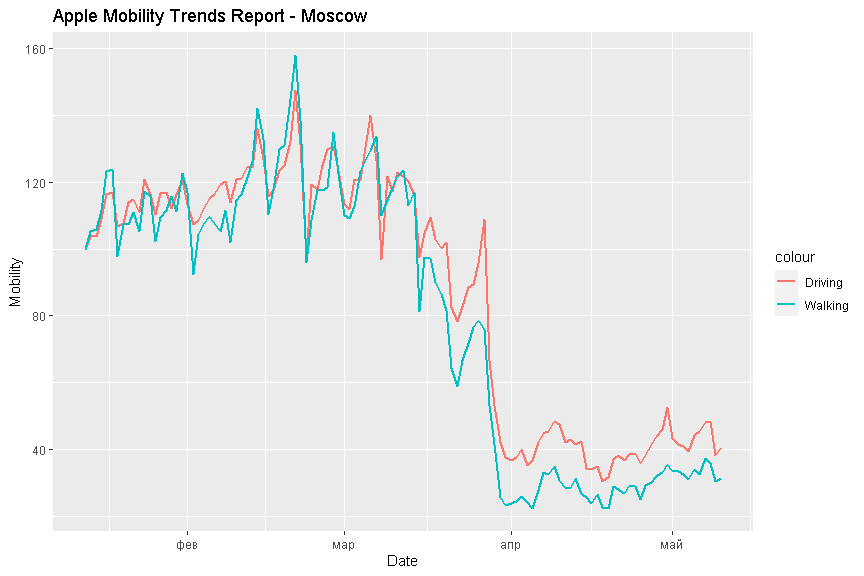


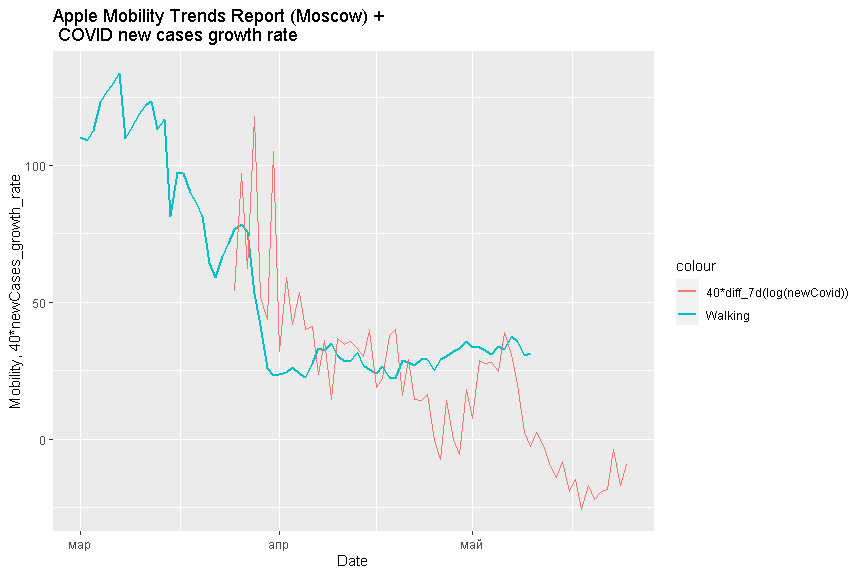
### ARMA errors

## Series: log(d1$newCases)   
## Regression with ARIMA(0,1,0) errors   
##   
## Coefficients:  
## xreg  
## 0.0419  
## s.e. 0.0317  
##   
## sigma^2 estimated as 0.05524: log likelihood=2.07  
## AIC=-0.15 AICc=0.09 BIC=3.83  
##   
## Training set error measures:  
## ME RMSE MAE MPE MAPE MASE  
## Training set 9.093067e-05 0.2307266 0.1734004 0.03401415 2.295885 0.967686  
## ACF1  
## Training set -0.305006



## Apple mobility trends





## Rolling sum over 2 weeks (aka active cases)

