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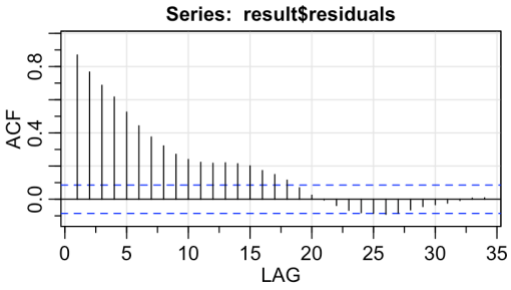
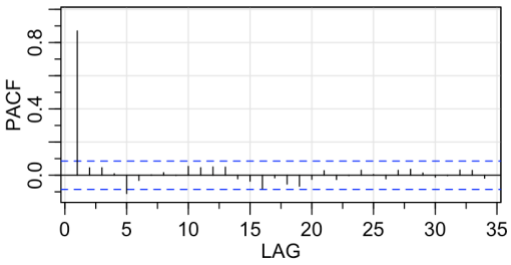
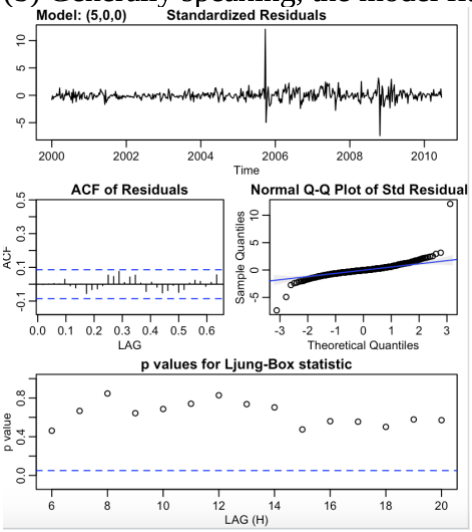
STAT 5170
Homework 10

Question 1
(a) AR(5) seems to be appropriate.





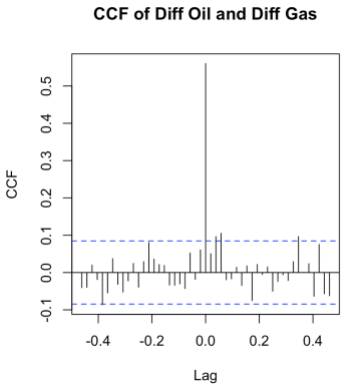
(b) Generally speaking, the model fits the data well. Diagnostics are satisfactory.



(c) gas=20.8878+2.3212*oil+u_t
where u_t=0.8358*u_{t-1}+0.0186*u_{t-2}+0.0412*u_{t-3}+0.0924*u_{t-4}-0.1102*u_{t-5}+wt

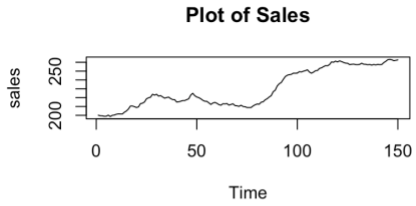
	Estimate	SE	t.value	p.value
ar1	0.8358	0.0431	19.3988	0.0000
ar2	0.0186	0.0556	0.3342	0.7383
ar3	0.0412	0.0555	0.7427	0.4580
ar4	0.0924	0.0557	1.6586	0.0978
ar5	-0.1102	0.0426	-2.5893	0.0099
intercept	20.8878	4.6811	4.4622	0.0000
xreg	2.3212	0.0786	29.5412	0.0000

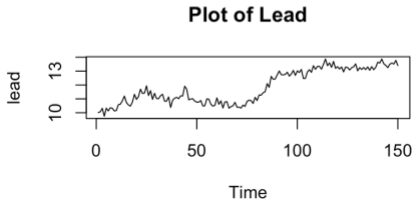
(e) CCP shows significant at lag 0 and insignificant otherwise. We are not regressing on past terms, so a lagged regression is not necessary.



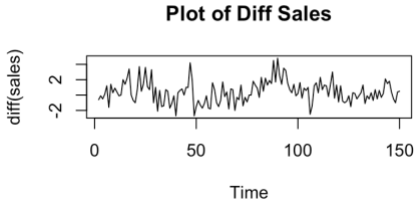
Question 2

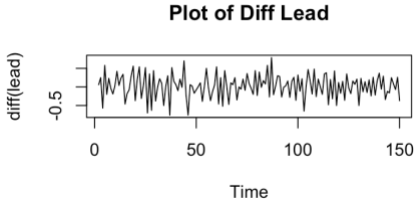
(a) Both plots show increasing trend, so they are not stationary.



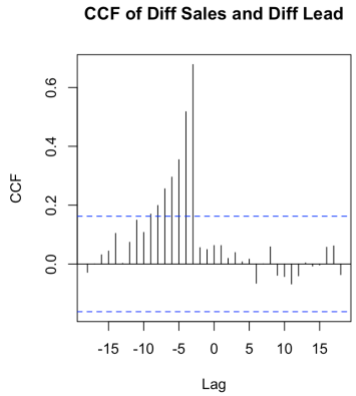


(b) Both subsequent plots are reasonably stationary.
There is no obvious trend and variance are constant.

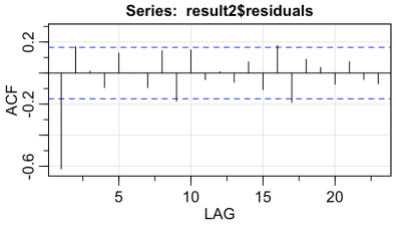


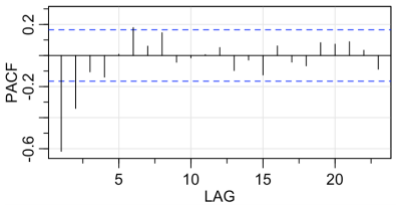


(c) We regress ∇y_t on ∇x_{t-3} and ∇y_{t-1}

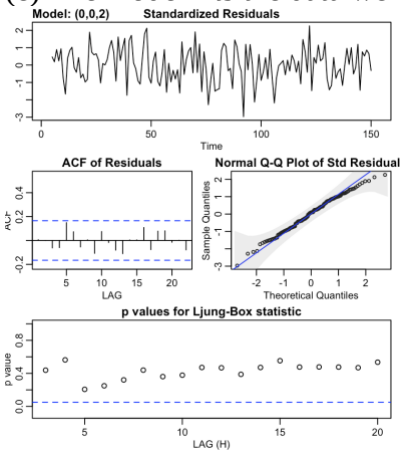


(d) I will consider MA(2).





(e) The model fits the data well, passing all diagnostics.



(f) $\nabla y_t = 0.0097 + 4.6985 * \nabla x_{t-3} + 0.7258 * \nabla y_{t-1} + u_t$
where $u_t = 0.4236 * w_{t-2} - 1.3348 * w_{t-1} + w_t$

	Estimate	SE	t.value	p.value
ma1	-1.3348	0.0780	-17.1062	0
ma2	0.4236	0.0806	5.2553	0
intercept	0.0097	0.0019	5.0906	0
lag(diff(sales), -1)	0.7258	0.0035	209.3931	0
lag(diff(lead), -3)	4.6985	0.0503	93.4830	0