

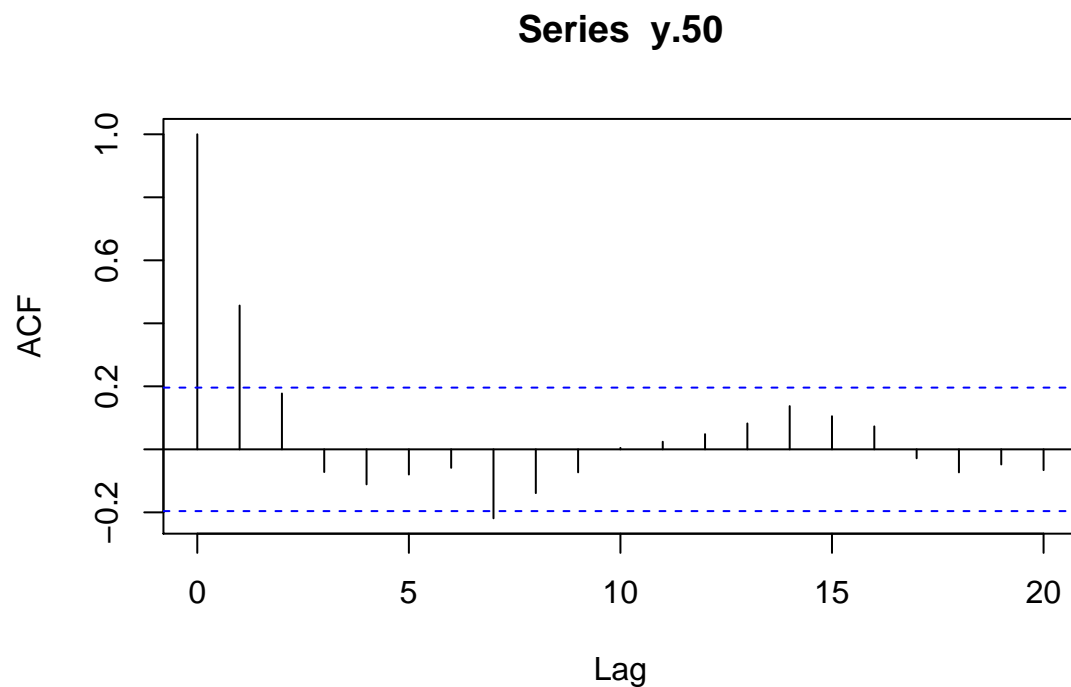
Homework 2 R Problem

```
set.seed(2)
```

a) ACF

```
# a) AR(1) series with phi = 0.5
y.50 <- arima.sim(model = list(ar = 0.5), n = 100)

# plot ACF of AR(1) series with phi = 0.5
acf(y.50)
```



```
y_acf_values <- acf(y.50, plot = FALSE)
y_acf_values$acf
```

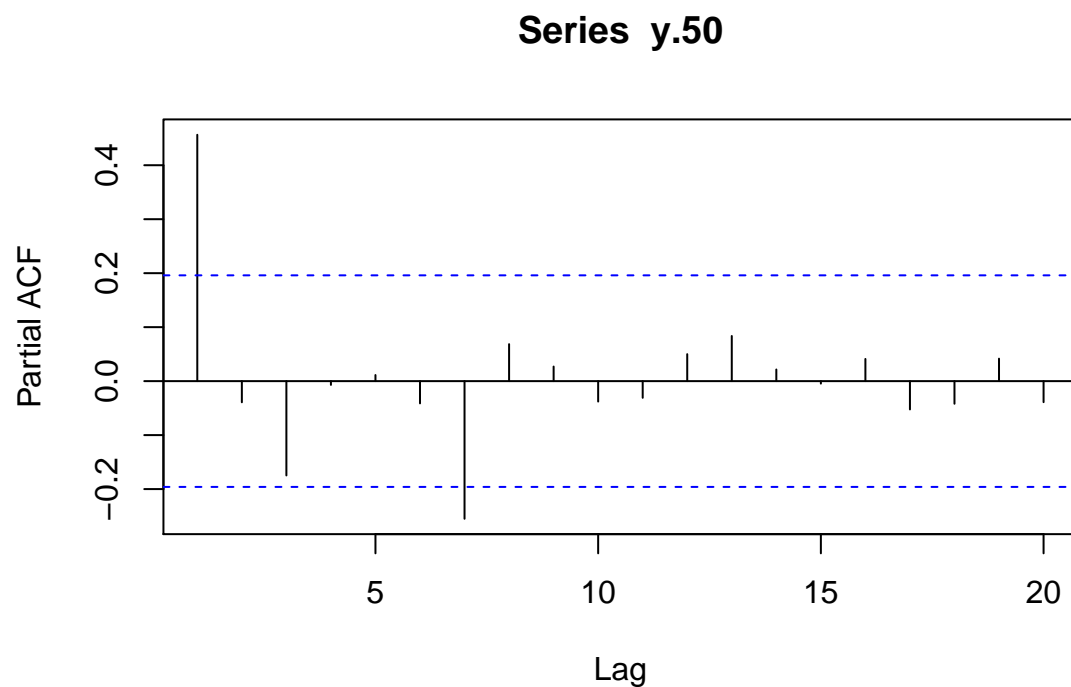
```
## , , 1
##
##      [,1]
## [1,] 1.000000000
```

```
## [2,] 0.456407732
## [3,] 0.177230916
## [4,] -0.071981494
## [5,] -0.111073841
## [6,] -0.079874933
## [7,] -0.058616143
## [8,] -0.218855549
## [9,] -0.138868166
## [10,] -0.072900659
## [11,] 0.004573513
## [12,] 0.024174182
## [13,] 0.048179630
## [14,] 0.082197678
## [15,] 0.137261651
## [16,] 0.105199109
## [17,] 0.072913649
## [18,] -0.028337238
## [19,] -0.073045319
## [20,] -0.047920471
## [21,] -0.065887861
```

Comparing the ACF of $\phi = 0.5$ with answer from Exercise 3.1, both have similar values.

PACF

```
# plot PACF of AR(1) series with phi = 0.5
acf(y.50, type = "partial")
```



```
y_pacf_values <- acf(y.50, plot = FALSE, type = "partial")
y_pacf_values$acf
```

```
## , , 1
##
##      [,1]
## [1,] 0.456407732
## [2,] -0.039254032
## [3,] -0.174744252
## [4,] -0.007050781
## [5,] 0.011324608
## [6,] -0.041286401
## [7,] -0.255048863
## [8,] 0.068537680
## [9,] 0.027009750
## [10,] -0.037883358
## [11,] -0.030948631
## [12,] 0.050008586
## [13,] 0.083653500
## [14,] 0.021588056
## [15,] -0.004644291
## [16,] 0.041094359
## [17,] -0.052483404
## [18,] -0.041966874
## [19,] 0.041631822
## [20,] -0.039006680
```

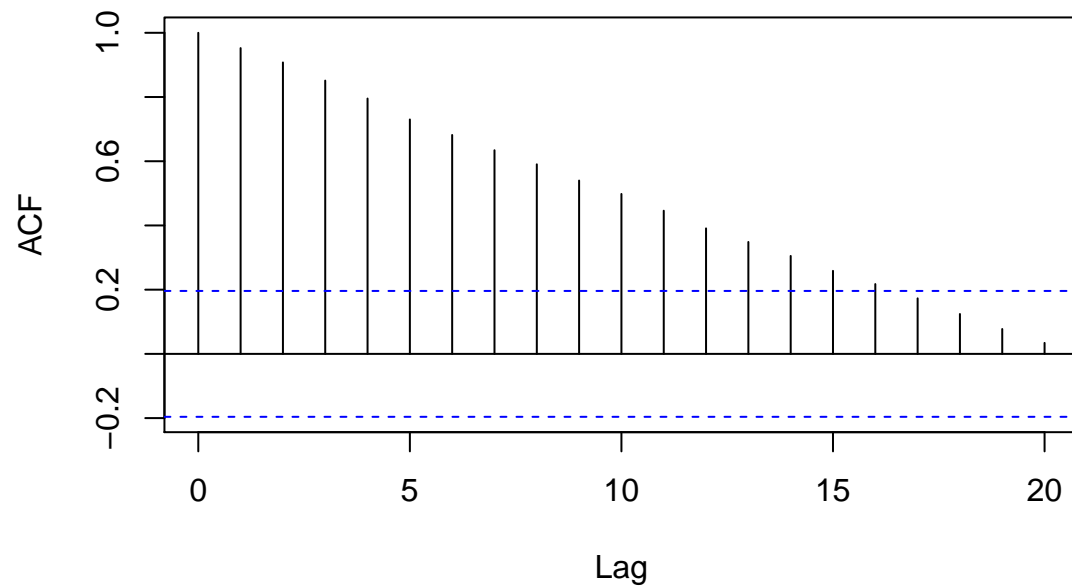
The PACF with $k > 2$ are equal to 0 from Exercise 3.1. Here, it's slightly more or less than 0 when $k > 2$, which is still relatively similar to answer from Exercise 3.1.

b) ACF

```
# a) AR(1) series with phi = 0.98
y.98 <- arima.sim(model = list(ar = 0.98), n = 100)

# plot ACF of AR(1) series with phi = 0.98
acf(y.98)
```

Series y.98



```
y_acf_values <- acf(y.98, plot = FALSE)
```

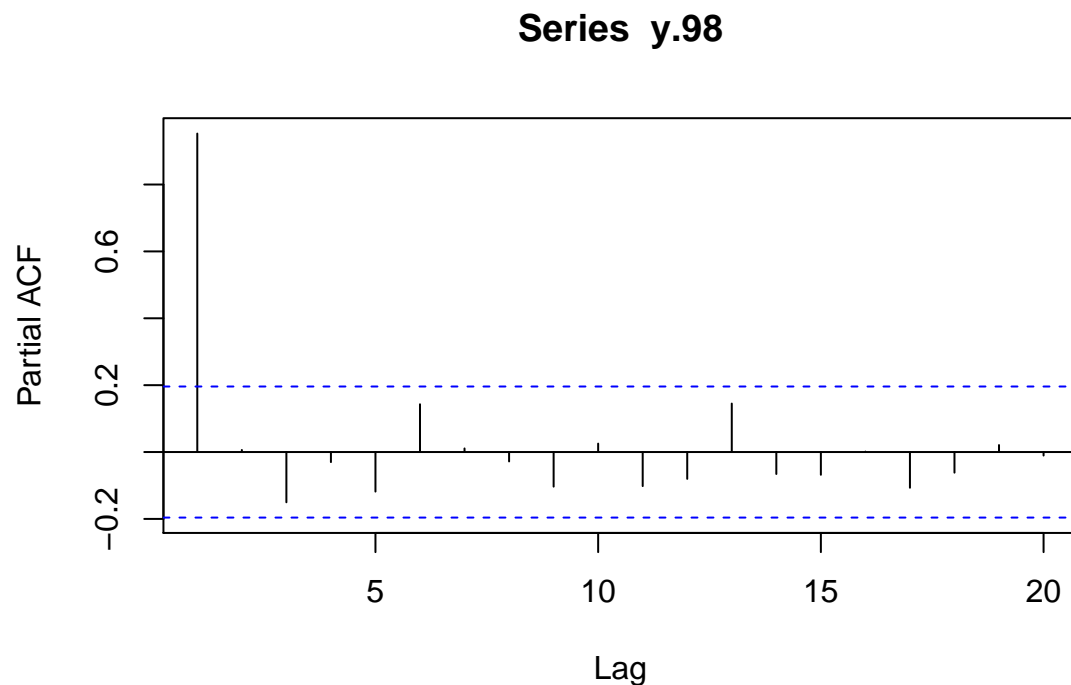
```
y_acf_values$acf
```

```
## , , 1
##
##      [,1]
## [1,] 1.00000000
## [2,] 0.95243250
## [3,] 0.90770917
## [4,] 0.85112559
## [5,] 0.79528992
## [6,] 0.73013684
## [7,] 0.68183504
## [8,] 0.63429295
## [9,] 0.59044338
## [10,] 0.53990714
## [11,] 0.49812950
## [12,] 0.44591412
## [13,] 0.39099328
## [14,] 0.34863075
## [15,] 0.30510393
## [16,] 0.25868404
## [17,] 0.21749125
## [18,] 0.17299319
## [19,] 0.12426313
## [20,] 0.07749455
## [21,] 0.03423956
```

The ACF for $\phi = 0.8$ in R decreases much faster than the ACF from Exercise 3.1. However, the values are not too far apart.

PACF

```
# plot PACF of AR(1) series with phi = 0.98
acf(y.98, type = "partial")
```



```
y_pacf_values <- acf(y.98, plot = FALSE, type = "partial")
y_pacf_values$acf
```

```
## , , 1
##
##      [,1]
## [1,] 0.952432497
## [2,] 0.006261395
## [3,] -0.150282135
## [4,] -0.030130732
## [5,] -0.118300739
## [6,] 0.142970475
## [7,] 0.010795768
## [8,] -0.028094471
## [9,] -0.103509169
## [10,] 0.025218844
## [11,] -0.101928358
```

```
## [12,] -0.080286708
## [13,]  0.144993136
## [14,] -0.065663089
## [15,] -0.068035092
## [16,]  0.001396927
## [17,] -0.106845600
## [18,] -0.061706080
## [19,]  0.020900312
## [20,] -0.010466476
```

Here, when $k = 0$, PCAF is not equal to 1. However, it's still very close to 1. When $k = 1$, the PACF is supposed to be closer to 1 from Exercise 3.1, but it's closer to 0.