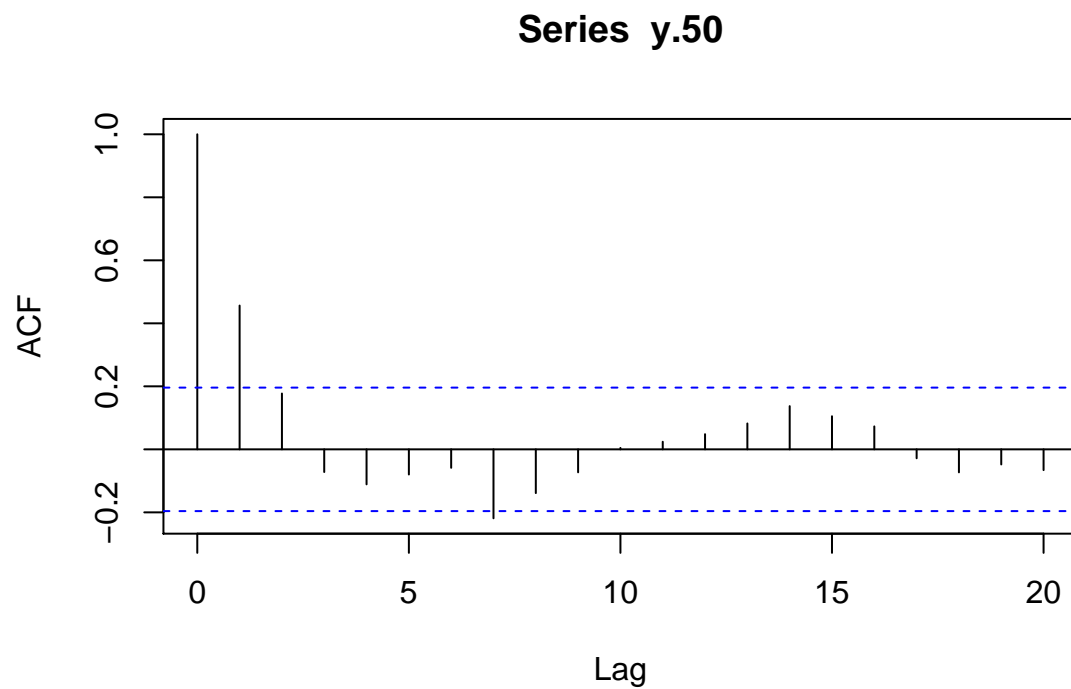# Homework 2 R Problem

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

a) ACF

```r
# 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)
```

Series y.50

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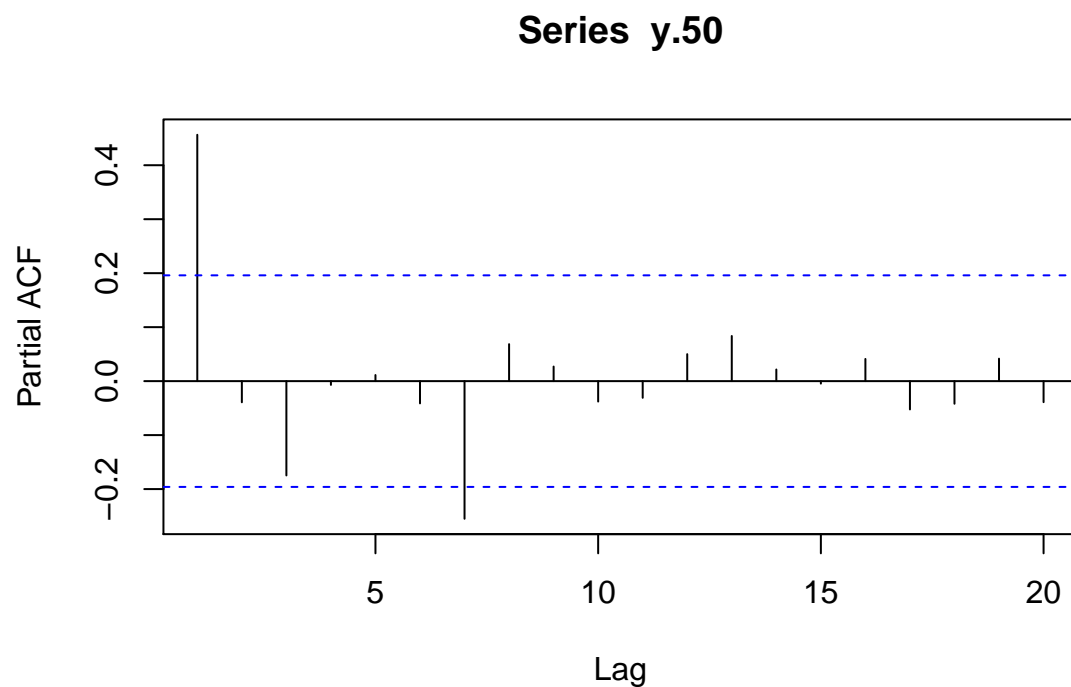
```
y_pacf_values <- acf(y.50, plot = FALSE, type = "partial")

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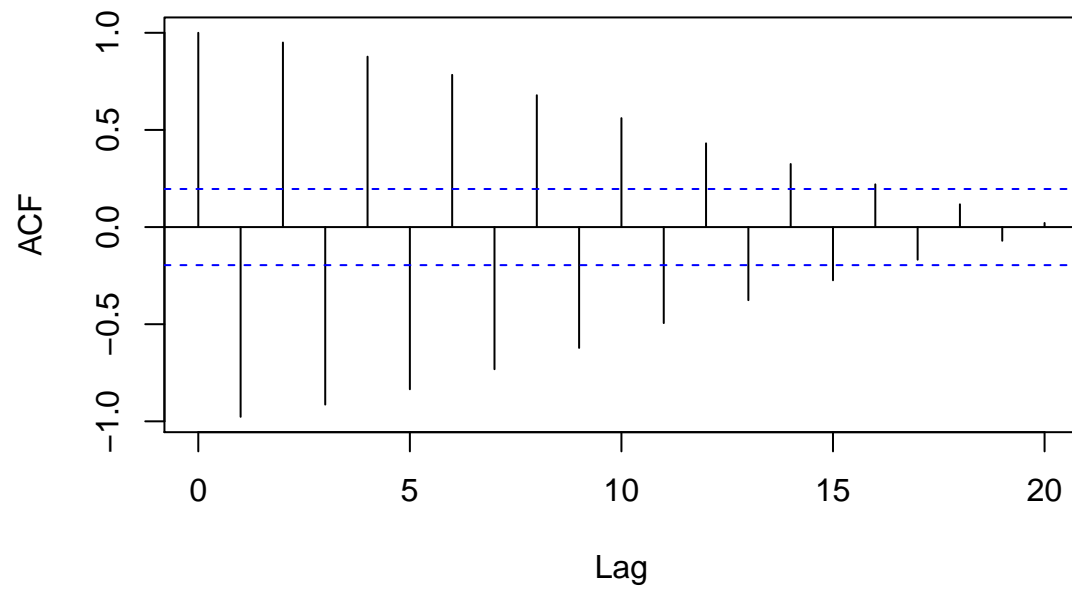
The PACF with $k > 2$ are equal to 0 from Exercise 3.1. Here, it's slightly more or less than 0 when $k > 2$, which is still relatively similar to answer from Exercise 3.1.

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,]  -0.97677891
## [3,]   0.94996095
## [4,]  -0.91377189
## [5,]   0.87719861
## [6,]  -0.83490631
## [7,]   0.78355674
## [8,]  -0.73174023
## [9,]   0.67866957
## [10,] -0.62207870
## [11,]  0.56073667
## [12,] -0.49430312
## [13,]  0.43098663
## [14,] -0.37626696
## [15,]  0.32456442
## [16,] -0.27387787
## [17,]  0.21991694
## [18,] -0.16794373
## [19,]  0.11717676
## [20,] -0.07042299
## [21,]  0.02105614
```

The ACF for phi = 0.98 in R, the values are also similar to Exercise 3.1.

PACF

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

Series y.98
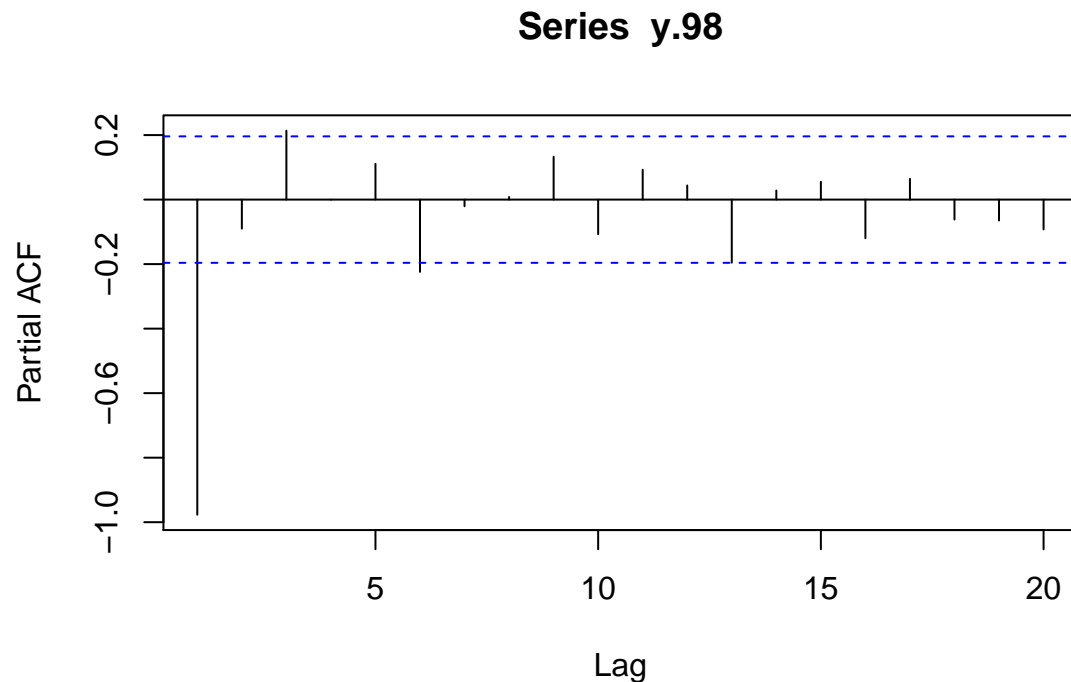

```r
y_pacf_values <- acf(y.98, plot = FALSE, type = "partial")

y_pacf_values$acf
```

```
## , , 1
##
##                 [,1]
## [1,] -0.9767789129
## [2,] -0.0901051283
## [3,]  0.2136131363
## [4,] -0.0002978241
## [5,]  0.1107155689
## [6,] -0.2240810830
## [7,] -0.0206345138
## [8,]  0.0080086916
## [9,]  0.1329421091
## [10,] -0.1073070447
## [11,]  0.0926112262
## [12,]  0.0437971662
```

```
## [13,] -0.1956436941
## [14,]  0.0280227474
## [15,]  0.0552841946
## [16,] -0.1198905029
## [17,]  0.0641688190
## [18,] -0.0618352165
## [19,] -0.0649022461
## [20,] -0.0923450575
```

The values in R here are also the same as PACF in Exercise 3.1b