MATH 5075 R Project 3

Your Name Here

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Remember: I expect to see commentary either in the text, in the code with comments created using **#**, *or (preferably) both!* ***Failing to do so may result in lost points!***

Because randomization is used in this assignment, I set the seed here, in addition to beginning each code block. ***Do not change the seed!***

```
set.seed(10182016)
```

Problem 1

Consider the following MA(q) process (with w_t being i.i.d. standard Normal random variables):

$$x_t = w_t + \frac{1}{2}w_{t-1} + \frac{1}{4}w_{t-2}$$

1. *Simulate this process in R using the function* `arima.sim()` *for $T = 500$ observations, burning in for 1000 observations.*

```
# Your code here
```

2. *Compute and plot the sample autocorrelation function for the simulated process using* `acf()`*. Compare the sample autocorrelation function to the theoretical autocorrelation function, which you can compute and plot using* `ARMAacf()`*.*

```
# Your code here
```

Problem 2

Consider the following ARMA(p, q) process (with w_t being i.i.d. standard Normal random variables):

$$x_t = -\frac{1}{3}x_{t-1} + \frac{1}{2}x_{t-2} + w_t + \frac{1}{2}w_{t-1} + \frac{1}{4}w_{t-2}$$

1. *Simulate this process in R using the function* `arima.sim()` *for $T = 500$ observations, burning in for 1000 observations.*

```
# Your code here
```

2. *Compute and plot the sample autocorrelation function for the simulated process using* `acf()`*. Compare the sample autocorrelation function to the theoretical autocorrelation function, which you can compute and plot using* `ARMAacf()`*.*

```
# Your code here
```

3. *The above process is a stationary and invertible process (why?), which implies that the process can be written in the form:*

$$x_t = \sum_{l=0}^{\infty} \psi_l w_{t-l}$$

*Use the function **`ARMAtoMA()`** to compute the first 25 ψ-weights for this process (the theoretical ψ-weights, not the empirical), and plot them.*

```
# Your code here
```