

HW1 is 1.3, 1.20, 1.27.

1.3 asks you to generate 100 observations from an autoregressive model.

Suppose we want to simulate  $x_t = 0.7 x_{t-1} + 0.6 x_{t-2} + w_t$ , where  $\sigma^2 = v(w_t) = 1$ . And suppose we want to MA filter it generating  $y_t = 0.5 x_{t-1} + 0.25 x_{t-2} + 0.25 x_{t-3}$ .

```
w = rnorm(150,0,1)
x = filter(w, filter=c(0.7,0.6), method="recursive")[-(1:50)]
y = filter(x, c(0.5,0.25,0.25), sides = 1)
plot.ts(x)
lines(y,lty=2)
```

1.20 wants you to simulate a WN process and find the sample acf. Use the R function `acf()`. See p29 for an example. You can choose what  $\sigma^2$  is for your WN process.

1.27 wants you to consider a 2nd-order stationary process  $x_t$  with mean  $\mu$  and autocovariance  $\gamma(h)$ . Remember  $\gamma(h) = E(X_t X_{t+h})$ . Also, use the fact that expectation is linear, so  $E((X+Y)^2) = E(X^2+2XY+Y^2) = E(X^2)+2E(XY)+E(Y^2)$ . And also use stationarity here. If  $X$  is 2nd-order stationary, what does that tell you about  $E(X_t)$  and  $E(X_{t+h})$ ?