

Homework 1, Stat415, due Thu Apr20, 1159pm, by email to frederic@stat.UCLA.edu .

1. List the names and email addresses of two other students in this course.

2. From the textbook, problems 1.3, 1.19, 1.20, and 1.27.

1.3. 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 $y_t = 0.5 x_{t-1} + 0.25 x_{t-2} + 0.25 x_{t-3}$.

```
install.packages("astsa")
library(astsa)
w = rnorm(150,0,1)
myfilter= stats::filter
x = myfilter(w, filter=c(0.7,0.6))[51:150]
y = myfilter(x, c(0.5,0.25,0.25), sides = 1)
plot.ts(x)
lines(y,lty=2)
```

1.19. Find the true autocovariance function of $x_t = \mu + w_t + \theta w_{t-1}$.

$\gamma(h) = \text{cov}(x_t, x_{t+h})$. See p17 for an example.

1.20. Simulate a process and find the sample acf. Use the R function acf().

See p29 for an example.

1.27. Suppose a process x_t is stationary with mean μ and autocovariance $\gamma(h)$. What is

$E(x_t^2)$? What is $E(x_{t+h}^2)$?