R Code Handout – Decomposition and Smoothing

**Example 1: Australian Beer Production**

library(astsa)

beerprod = read.csv("Beer.csv")

beerprod = ts (beerprod[,1], freq = 4)

#additive decomp

decompbeer = decompose (beerprod, type="additive")

plot (decompbeer)

decompbeer

#multiplicative decomp

decombeermult = decompose (beerprod, type = "multiplicative")

decombeermult$figure

#Additive decomp with Lowess smoother

stl (beerprod, "periodic")

#Plots of additive decomp with Lowess smoother

plot(stl(beerprod, "periodic"))

library(astsa)

beerprods = read.csv("Beer.csv", )[,1]

trendpattern = filter (beerprods, filter = c(1/8, 1/4, 1/4, 1/4, 1/8), sides=2)

plot (beerprods, type= "b", main = "moving average annual trend")

lines (trendpattern)

seasonals = beerprods - trendpattern

plot (seasonals, type = "b", main = "Seasonal pattern for beer production")

trendpattern2 = filter (beerprod, filter = c(1/4, 1/4, 1/4, 1/4), sides=1)

plot (trendpattern2, type = "b", main = "Trendpattern2 - Average of Past Year")

**Example 2: U.S. Employment**

library(astsa)

unemploy = scan("unemp.dat")

trendunemploy=filter(unemploy, filter=c(1/24,1/12,1/12,1/12,1/12,1/12,1/12,1/12,1/12,1/12,1/12,1/12,1/24), sides=2)

trendunemploy = ts(trendunemploy, start = c(1948,1), freq = 12)

plot(trendunemploy, main="Trend in U.S. Unemployment, 1948-1978", xlab = "Year")

#Smoothed trend using Lowess smoother

unemploy = ts(unemploy, start = c(1948,1), freq=12)  
plot(lowess(unemploy, f = 2/3), main ="Lowess smoothing of U.S. Unemployment Trend")

**Example 3: Oil Index**

#First line reads in a .dat file with multiple columns separate by space with variable names and using second column

oilindex = read.delim("oildata.dat", header = TRUE, sep = "") [,2]  
plot (oilindex, type = "b", main = "Log of Oil Index Series")  
expsmoothfit = arima (oilindex, order = c(0,1,1))  
expsmoothfit # to see the arima results  
predicteds = oilindex - expsmoothfit$residuals # predicted values  
plot (oilindex, type="b", main = "Exponential Smoothing of Log of Oil Index")  
lines (predicteds)  
1.3877\*oilindex[100]-0.3877\*predicteds[100] # forecast for time 101