#Time Series Data using class ts()

#frequency=7: a weekly series###I frequency=12: a monthly series####I frequency=4: a quarterly series

a <- ts(1:20, frequency = 12, start = c(2011, 3))

print(a)

str(a)

attributes(a)

#Decompose a time series into components

##I Trend component: long term trend

##I Seasonal component: seasonal variation

##I Cyclical component: repeated but non-periodic fluctuations

##I Irregular component: the residuals

plot(AirPassengers)

apts <- ts(AirPassengers, frequency = 12)

f <- decompose(apts)

plot(f$figure, type = "b") # seasonal figures

plot(f)

# time series forecasting

# build an ARIMA model

fit <- arima(AirPassengers, order = c(1, 0, 0), list(order = c(2,1, 0), period = 12))

fore <- predict(fit, n.ahead = 24)

# error bounds at 95% confidence level

U <- fore$pred + 2 \* fore$se

L <- fore$pred - 2 \* fore$se

ts.plot(AirPassengers, fore$pred, U, L, col = c(1, 2, 4, 4), lty = c(1, 1, 2, 2))

legend("topleft", col = c(1, 2, 4), lty = c(1, 1, 2),c("Actual", "Forecast", "Error Bounds (95% Confidence)"))