Homework Five

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```
library(fpp)
```

```
## Loading required package: forecast
```

```
## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo
```

```
## Loading required package: fma
```

```
## Loading required package: expsmooth
```

```
## Loading required package: lmtest
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
## Loading required package: tseries
```

```
library(fpp2)
```

```
## -- Attaching packages --------------------------------------------- fpp2 2.4 --
```

```
## v ggplot2 3.3.6
```

```
##
```

```
##
## Attaching package: 'fpp2'
```

```
## The following objects are masked from 'package:fpp':
##
##     ausair, ausbeer, austa, austourists, debitcards, departures,
##     elecequip, euretail, guinearice, oil, sunspotarea, usmelec
```

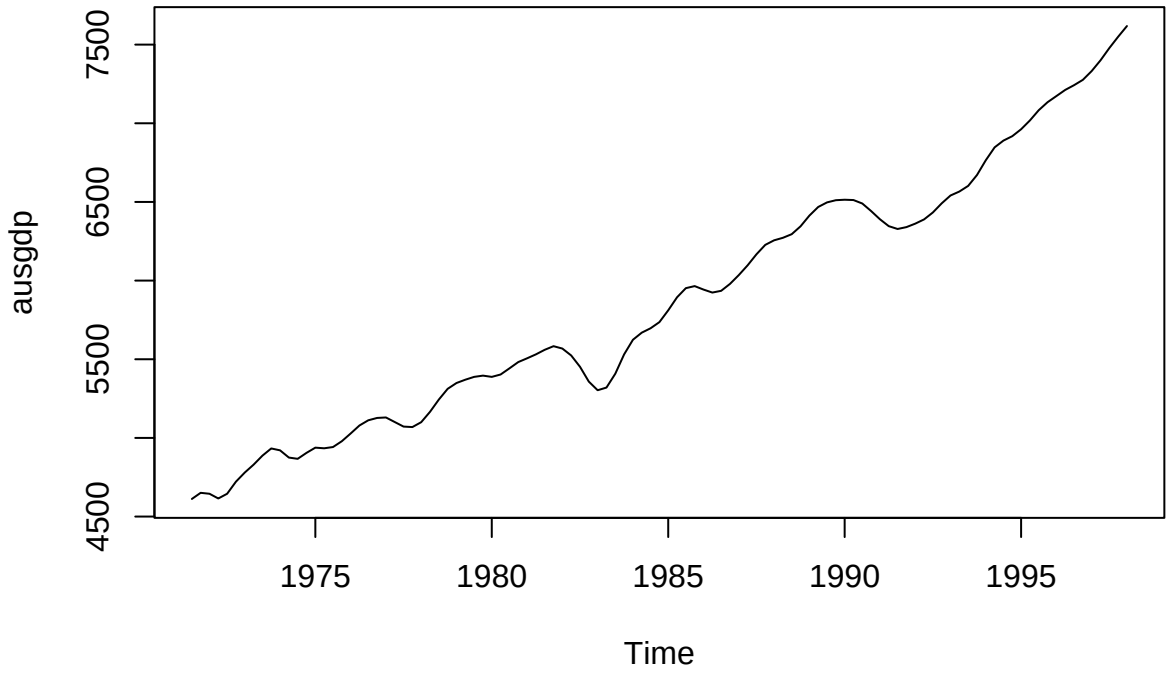
```
?ausgdp

head(ausgdp)
```

```
##      Qtr1 Qtr2 Qtr3 Qtr4
## 1971           4612 4651
## 1972 4645 4615 4645 4722
```

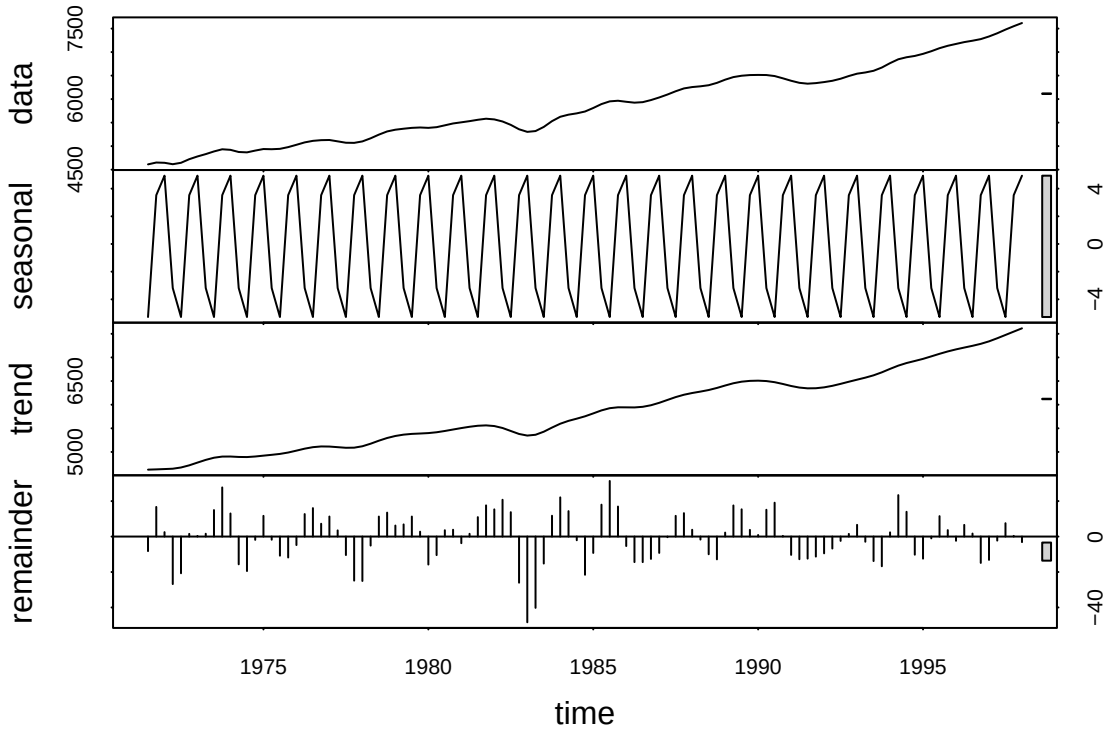
```
#This "head" code outlines the first set/line of information of the data set. Given the description of

plot(ausgdp)
```




```
#The plot of the graph helps uncover any trends or seasonality. After reviewing the graph there is a cl


stl_decomp <- stl(ausgdp,s.window ="periodic")
plot(stl_decomp)
```




```
attributes(stl_decomp)
```

```
## $names
## [1] "time.series" "weights"     "call"        "win"         "deg"
## [6] "jump"        "inner"       "outer"
##
## $class
## [1] "stl"
```

```
#The stl code is used to Decompose a time series into seasonal, trend and irregular components using lo

# Lets print out a seasonal adjustment: The seasonal adjusted code "Returns seasonally adjusted data co

?seasadj

seasadj(stl_decomp)
```

```
##          Qtr1     Qtr2     Qtr3     Qtr4
## 1971                      4617.278 4647.473
## 1972 4640.062 4618.186 4650.278 4718.473
## 1973 4775.062 4833.186 4892.278 4929.473
## 1974 4916.062 4878.186 4872.278 4901.473
## 1975 4933.062 4937.186 4947.278 4975.473
## 1976 5023.062 5082.186 5117.278 5123.473
```

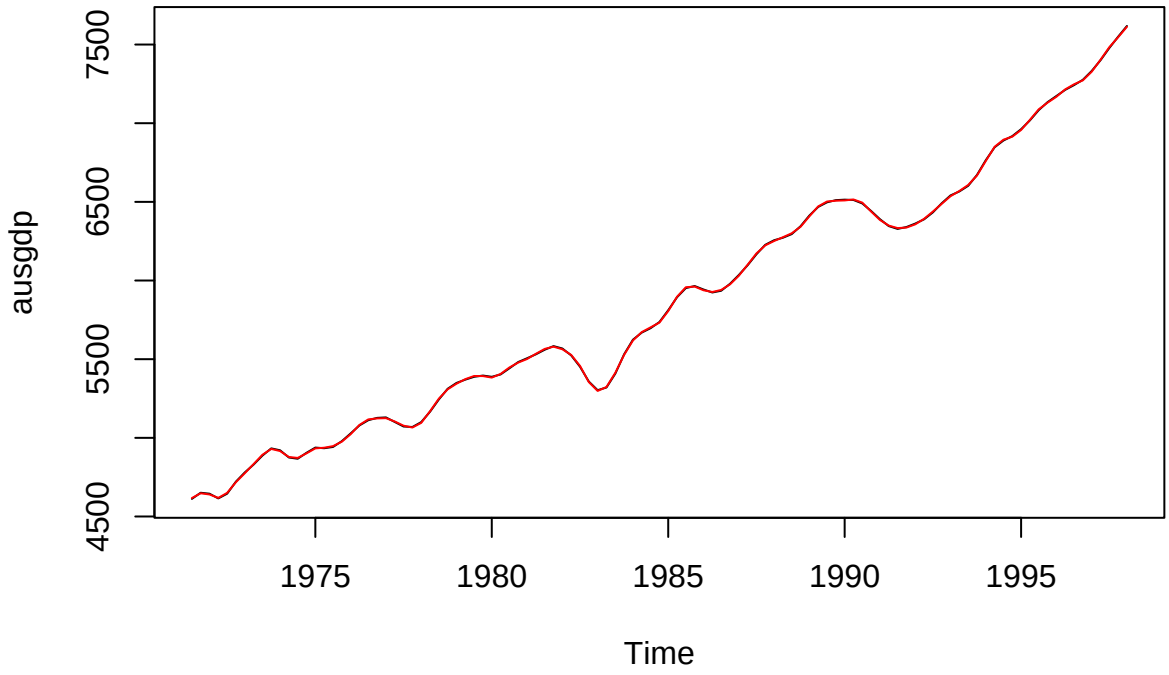
```
## 1977 5125.062 5104.186 5077.278 5065.473
## 1978 5095.062 5169.186 5249.278 5308.473
## 1979 5344.062 5373.186 5393.278 5392.473
## 1980 5383.062 5406.186 5447.278 5478.473
## 1981 5501.062 5534.186 5565.278 5579.473
## 1982 5563.062 5527.186 5457.278 5354.473
## 1983 5298.062 5323.186 5413.278 5527.473
## 1984 5619.062 5672.186 5702.278 5732.473
## 1985 5806.062 5897.186 5957.278 5961.473
## 1986 5938.062 5927.186 5940.278 5975.473
## 1987 6030.062 6100.186 6172.278 6223.473
## 1988 6251.062 6275.186 6300.278 6341.473
## 1989 6408.062 6471.186 6502.278 6507.473
## 1990 6509.062 6515.186 6495.278 6438.473
## 1991 6385.062 6349.186 6333.278 6336.473
## 1992 6357.062 6392.186 6438.278 6487.473
## 1993 6536.062 6569.186 6607.278 6667.473
## 1994 6760.062 6850.186 6895.278 6914.473
## 1995 6957.062 7021.186 7088.278 7130.473
## 1996 7168.062 7215.186 7247.278 7272.473
## 1997 7327.062 7403.186 7483.278 7546.473
## 1998 7613.062
```

```
print(ausgdp)
```

```
##      Qtr1 Qtr2 Qtr3 Qtr4
## 1971           4612 4651
## 1972 4645 4615 4645 4722
## 1973 4780 4830 4887 4933
## 1974 4921 4875 4867 4905
## 1975 4938 4934 4942 4979
## 1976 5028 5079 5112 5127
## 1977 5130 5101 5072 5069
## 1978 5100 5166 5244 5312
## 1979 5349 5370 5388 5396
## 1980 5388 5403 5442 5482
## 1981 5506 5531 5560 5583
## 1982 5568 5524 5452 5358
## 1983 5303 5320 5408 5531
## 1984 5624 5669 5697 5736
## 1985 5811 5894 5952 5965
## 1986 5943 5924 5935 5979
## 1987 6035 6097 6167 6227
## 1988 6256 6272 6295 6345
## 1989 6413 6468 6497 6511
## 1990 6514 6512 6490 6442
## 1991 6390 6346 6328 6340
## 1992 6362 6389 6433 6491
## 1993 6541 6566 6602 6671
## 1994 6765 6847 6890 6918
## 1995 6962 7018 7083 7134
## 1996 7173 7212 7242 7276
## 1997 7332 7400 7478 7550
## 1998 7618
```

```r
# Plot a line on the graph
plot(ausgdp)

lines(seasadj(stl_decomp), col="Red")
```



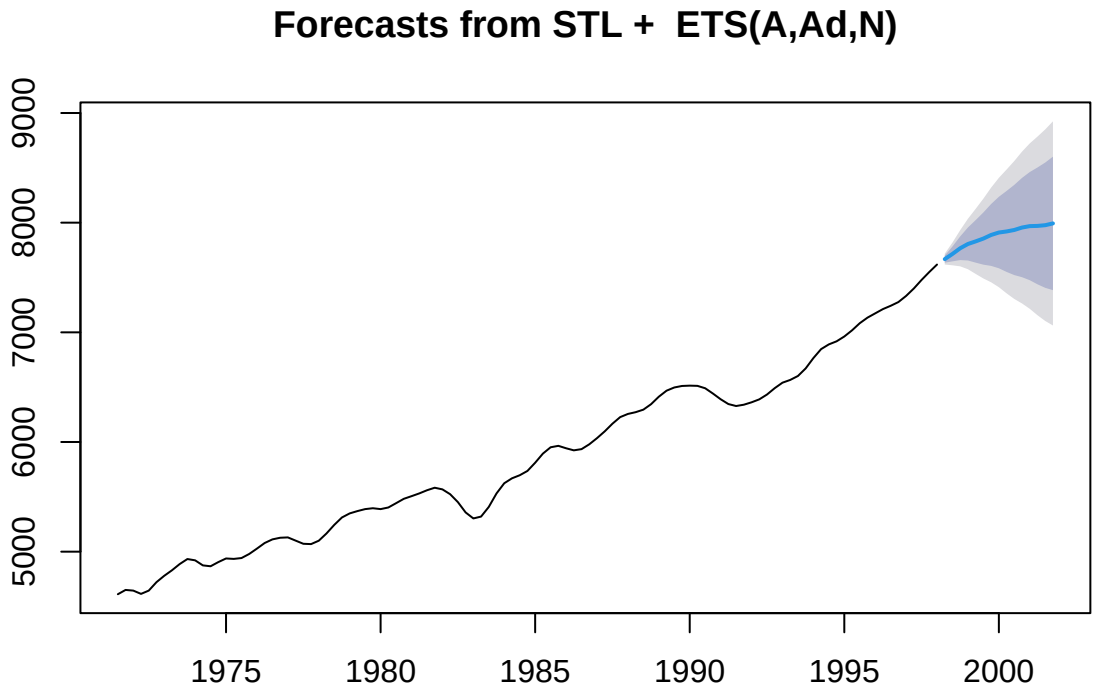

```r
# Default period forecast
f_stl <- forecast(stl_decomp)

# you can pass the # of period:
f_stl <- forecast(stl_decomp,h=15)
f_stl
```

```
##         Point Forecast    Lo 80    Hi 80    Lo 95    Hi 95
## 1998 Q2       7667.424 7635.294 7699.555 7618.285 7716.564
## 1998 Q3       7715.080 7647.122 7783.038 7611.147 7819.013
## 1998 Q4       7766.885 7658.930 7874.840 7601.782 7931.988
## 1999 Q1       7805.465 7655.130 7955.799 7575.547 8035.382
## 1999 Q2       7829.468 7635.509 8023.427 7532.833 8126.103
## 1999 Q3       7855.147 7617.074 8093.220 7491.046 8219.248
## 1999 Q4       7887.955 7605.793 8170.118 7456.425 8319.485
## 2000 Q1       7910.115 7584.241 8235.989 7411.734 8408.496
## 2000 Q2       7919.925 7550.959 8288.892 7355.640 8484.210
## 2000 Q3       7933.336 7522.061 8344.611 7304.345 8562.327
## 2000 Q4       7955.541 7502.847 8408.234 7263.205 8647.876
## 2001 Q1       7968.534 7475.378 8461.691 7214.316 8722.752
```

```
## 2001 Q2       7970.422 7437.794 8503.049 7155.838 8785.006
## 2001 Q3       7976.984 7405.890 8548.078 7103.571 8850.397
## 2001 Q4       7993.269 7384.711 8601.826 7062.560 8923.977
```

```
plot(f_stl)
```




```
# There is more than one way to do things
decomp_ausgdp <- decompose(ausgdp)

# Each one shows different attributes
attributes(decomp_ausgdp)
```

```
## $names
## [1] "x"        "seasonal" "trend"    "random"   "figure"   "type"
##
## $class
## [1] "decomposed.ts"
```

```
seasadj(decomp_ausgdp)
```

```
##          Qtr1     Qtr2     Qtr3     Qtr4
## 1971                     4614.204 4648.683
## 1972 4642.449 4617.665 4647.204 4719.683
## 1973 4777.449 4832.665 4889.204 4930.683
```

```
## 1974 4918.449 4877.665 4869.204 4902.683
## 1975 4935.449 4936.665 4944.204 4976.683
## 1976 5025.449 5081.665 5114.204 5124.683
## 1977 5127.449 5103.665 5074.204 5066.683
## 1978 5097.449 5168.665 5246.204 5309.683
## 1979 5346.449 5372.665 5390.204 5393.683
## 1980 5385.449 5405.665 5444.204 5479.683
## 1981 5503.449 5533.665 5562.204 5580.683
## 1982 5565.449 5526.665 5454.204 5355.683
## 1983 5300.449 5322.665 5410.204 5528.683
## 1984 5621.449 5671.665 5699.204 5733.683
## 1985 5808.449 5896.665 5954.204 5962.683
## 1986 5940.449 5926.665 5937.204 5976.683
## 1987 6032.449 6099.665 6169.204 6224.683
## 1988 6253.449 6274.665 6297.204 6342.683
## 1989 6410.449 6470.665 6499.204 6508.683
## 1990 6511.449 6514.665 6492.204 6439.683
## 1991 6387.449 6348.665 6330.204 6337.683
## 1992 6359.449 6391.665 6435.204 6488.683
## 1993 6538.449 6568.665 6604.204 6668.683
## 1994 6762.449 6849.665 6892.204 6915.683
## 1995 6959.449 7020.665 7085.204 7131.683
## 1996 7170.449 7214.665 7244.204 7273.683
## 1997 7329.449 7402.665 7480.204 7547.683
## 1998 7615.449
```