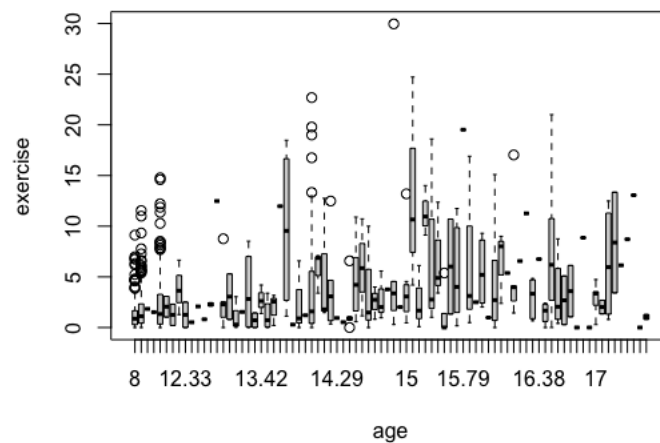


Victoria Haley

Homework 10

2.



```
> summary(aov(exercise~age + Error(subject), data=Blackmore))
```

Error: subject

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
age	1	66	65.92	2.696	0.102
Residuals	229	5600	24.45		

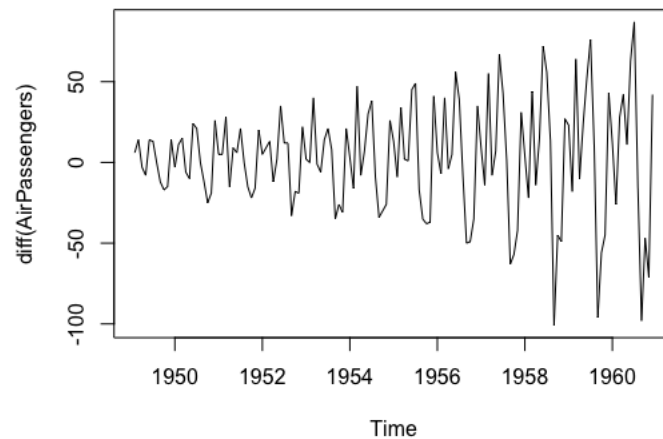
Error: Within

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
age	1	1402	1401.9	223.9	<2e-16 ***
Residuals	713	4464	6.3		

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

5.



Interpretation of differencing:

The amount of change between monthly totals of international airline passengers increases as years go by.

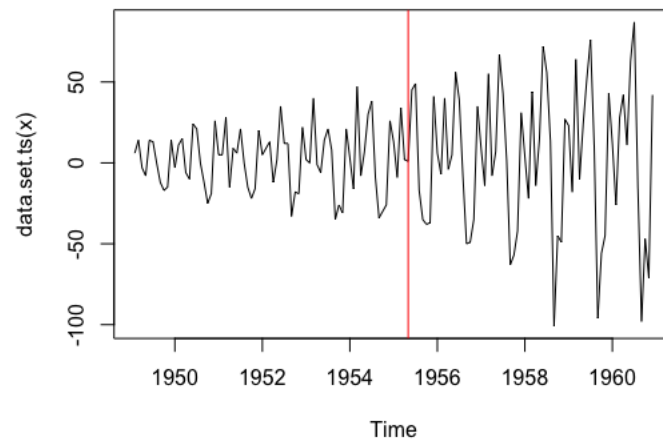
`cpt.var(AirPassengers)`

```
> cpt.var(diff(AirPassengers))
Class 'cpt' : Changepoint Object
  ~~      : S4 class containing 12 slots with names
            cpttype date version data.set method test.stat pen.type pen.value minse
            glen cpts ncpts.max param.est

Created on   : Fri Nov  4 07:37:30 2022

summary(.)  :
-----
Created Using changepoint version 2.2.4
Changepoint type      : Change in variance
Method of analysis    : AMOC
Test Statistic       : Normal
Type of penalty       : MBIC with value, 14.88853
Minimum Segment Length : 2
Maximum no. of cpts   : 1
Changepoint Locations : 76
```

Changepoint: 76, which is around 1955

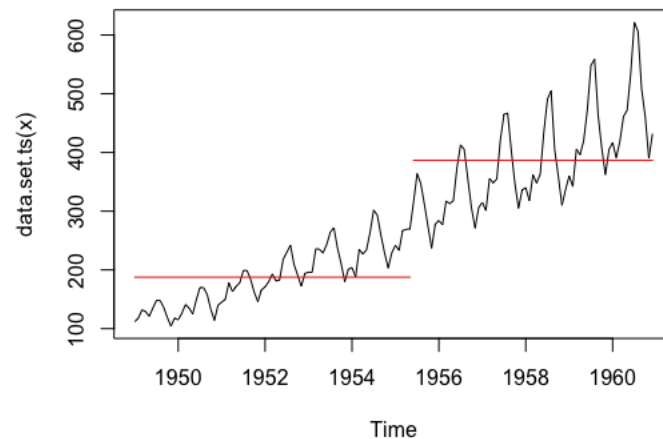


6.

```
> cpt.mean(AirPassengers)
Class 'cpt' : Changepoint Object
  ~~      : S4 class containing 12 slots with names
            cpttype date version data.set method test.stat pen.type pen.value minse
            glen cpts ncpts.max param.est

Created on   : Fri Nov  4 07:37:30 2022

summary(.) :
-----
Created Using changepoint version 2.2.4
Changepoint type      : Change in mean
Method of analysis    : AMOC
Test Statistic       : Normal
Type of penalty       : MBIC with value, 14.90944
Minimum Segment Length : 1
Maximum no. of cpts   : 1
Changepoint Locations : 77
```



The results from this exercise with the results from the `cpt.var()` above suggest that the monthly totals of international airline passengers boomed between 1952 and 1960, with a significant increase in 1955.

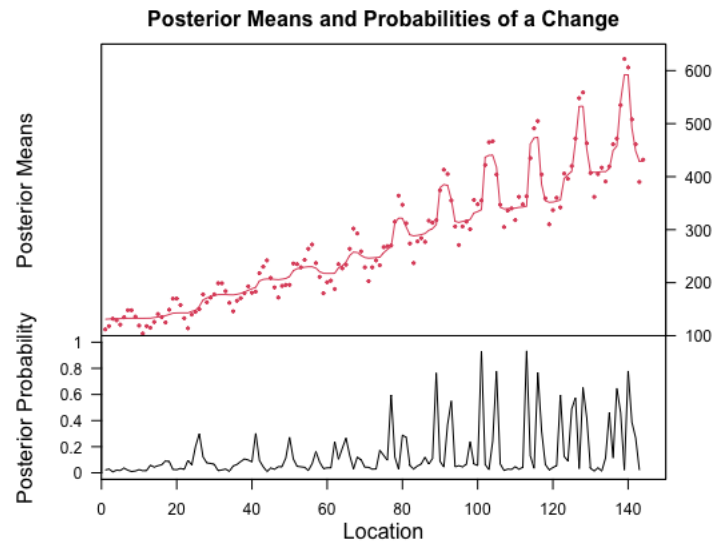
7. Between 1949 and 1960, air travel experienced significant growth and transformation. The post-World War II era saw the expansion of commercial air travel, as airlines sought to capitalize on the new opportunities afforded by jet engines and larger planes.

In the early years of this period, air travel was still a relatively expensive and exclusive mode of transportation, primarily used by the affluent and business class. However, with increased competition and technological advancements, air travel became more accessible and affordable for the average person.

Air travel also played a crucial role in the post-war economic recovery, as it facilitated the growth of international trade and tourism. The rise of the jet age allowed people to travel farther and faster than ever before, making the world seem smaller and more interconnected.

Overall, the period between 1949 and 1960 was a time of significant growth and transformation for air travel, marked by technological advancements, increased accessibility, and expanded global connectivity.

8.



Interpretation:

The plot above indicates that the mean changes over time were likely occurring around point 77 (1955ish) and onward. This result checks out with the `cpt.mean()` and `cpt.var()` results above