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S631 HW1

1. X is a random variable. S={set of all UN members} and X:S->R as a function that assigns to each country its corresponding female life expectancy in years(rounded to the nearest integer); z

s∈S,Let x be a number, the sets{s∈S,X(s)=x} another set{s∈S, X(s)<=x} (set of all UN members whose female life expectancy in years less than or equal to x

The probability for all possible sets exists, therefore, X is a random variable

2. a) { s∈S, X(s)<=80}
   b) { s∈S ,X(s)=75}
   c) { s∈S , 65<=X(s)<=70}

3. Let F be a function, F:Ω->[0,1]
   a)F(80)=P({ s∈S, X(s)<=80})
   b) P(x=75)=F(75)-F(74)
   c) P(65<=x<=70)=F(70)-F(64)

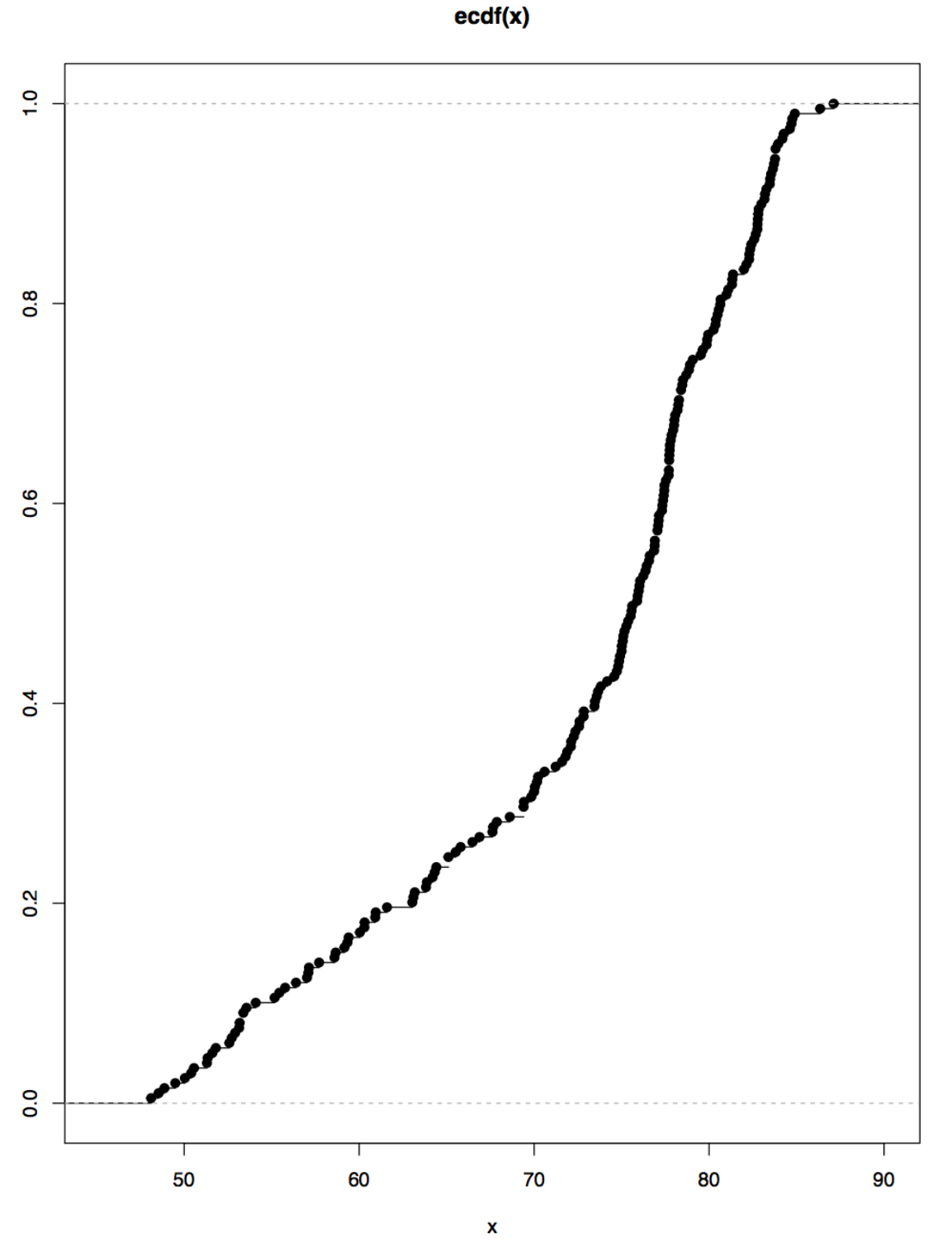
4.

```
> library(alr4)
> head(UN11)
                region    group fertility     ppgdp lifeExpF pctUrban
Afghanistan       Asia    other     5.968     499.0    49.49       23
Albania         Europe    other     1.525    3677.2    80.40       53
Algeria         Africa africa       2.142    4473.0    75.00       67
Angola          Africa africa       5.135    4321.9    53.17       59
Anguilla     Caribbean    other     2.000   13750.1    81.10      100
Argentina    Latin Amer    other     2.172    9162.1    79.89       93
> lifeexp = UN11$lifeExpF
> head(lifeexp)
```

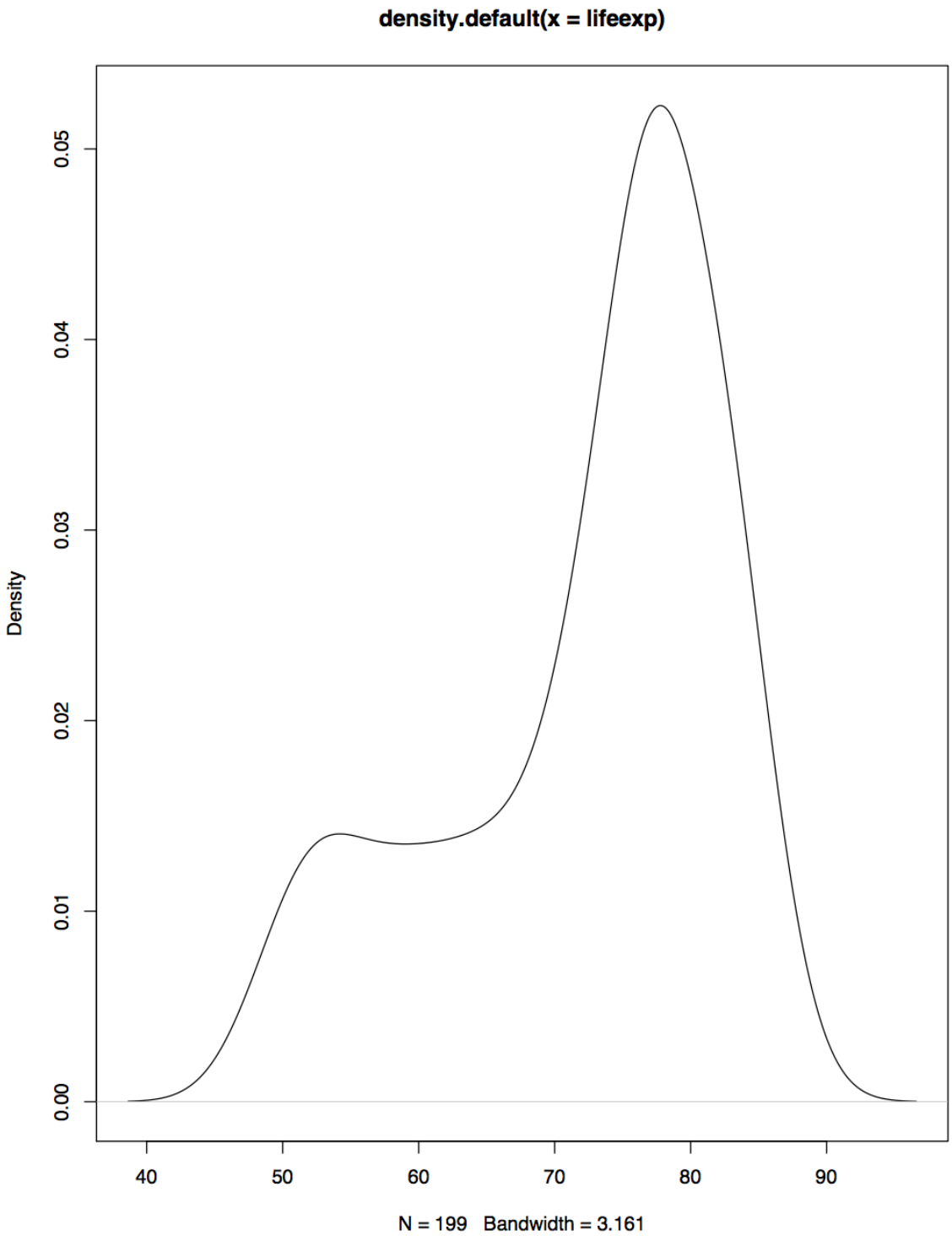
```
[1] 49.49 80.40 75.00 53.17 81.10 79.89
> lifeexp.r = round(lifeexp, 0)

> all=length(lifeexp.r)
> all
[1] 199
> p1=length(which(lifeexp.r<=80))
> p1
[1] 157
> p2=length(which(lifeexp.r==75))
> p2
[1] 12
> p3.1=length(which(lifeexp.r<=69))
> p3.1
[1] 60
> p3.2=length(which(lifeexp.r<=65))
> p3.2
[1] 49
> p3=p3.1-p3.2
> p3
[1] 11
> P1=p1/all
> P2=p2/all
> P3=p3/all
> P1
[1] 0.7889447
> P2
[1] 0.06030151
> P3
[1] 0.05527638
```

5. > plot.ecdf(lifeexp)



```
> plot(density(lifeexp))
```



Based on the graphs, the variable does not seem to follow a normal distribution since the curve under density.default(x=lifeexp) does not fall as a bell-shaped curve and it is more likes a skewed left shape (left-skewed distribution).