

10. Geometric and Harmonic mean

Ungrouped data

```
x=c(18, 19, 19, 19, 19, 20, 20, 20, 20, 20, 21, 21, 21, 21, 22, 23, 24, 27, 30, 36)
x
```

```
[1] 18 19 19 19 19 20 20 20 20 20 21 21 21 21 22 23 24 27 30 36
```

```
y=log(x,10)
y
```

```
[1] 1.255273 1.278754 1.278754 1.278754 1.278754 1.301030 1.301030 1.301030
[9] 1.301030 1.301030 1.322219 1.322219 1.322219 1.322219 1.342423 1.361728
[17] 1.380211 1.431364 1.477121 1.556303
```

```
#Geometric mean
logg=mean(y)
logg
```

```
[1] 1.335673
```

```
geo=10logg
geo
```

```
[1] 21.66073
```

```
#Harmonic mean
z=1/x
z
```

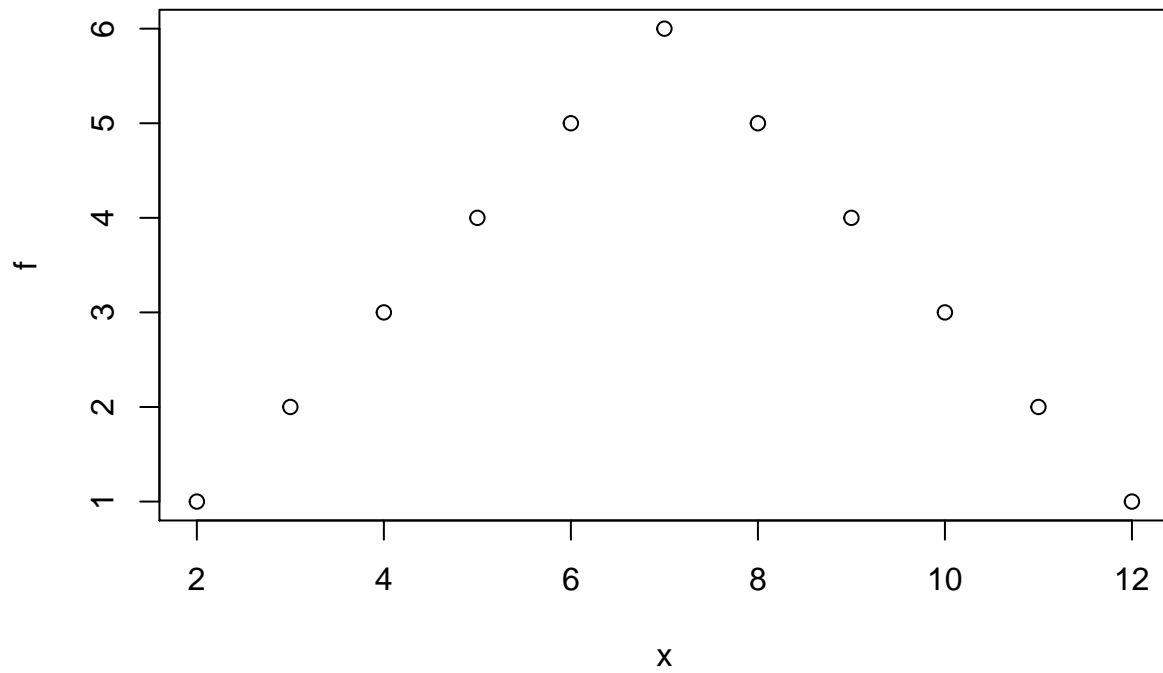
```
[1] 0.05555556 0.05263158 0.05263158 0.05263158 0.05263158 0.05000000
[7] 0.05000000 0.05000000 0.05000000 0.05000000 0.04761905 0.04761905
[13] 0.04761905 0.04761905 0.04545455 0.04347826 0.04166667 0.03703704
[19] 0.03333333 0.02777778
```

```
invh=mean(z)
h=1/invh
h
```

```
[1] 21.38338
```

Grouped frequency (discrete data)

```
x=c(2,3,4,5,6,7,8,9,10,11,12)
f=c(1,2,3,4,5,6,5,4,3,2,1)
plot(x,f)
```



```
y=rep(x,f)
y
```

```
[1] 2 3 3 4 4 4 5 5 5 5 6 6 6 6 6 7 7 7 7 7 7 8 8 8 8
[26] 8 9 9 9 9 10 10 10 11 11 12
```

```
N=length(y)
mean=sum(y)/N
mean
```

```
[1] 7
```

```
median=median(y)
median
```

```
[1] 7
```

```
mode=which(f==max(f))
mode
```

```
[1] 6
```

```
fr.dist=data.frame(x,f)
fr.dist
```

```
      x f
1     2 1
2     3 2
3     4 3
4     5 4
5     6 5
6     7 6
7     8 5
8     9 4
9    10 3
10   11 2
11   12 1
```

```
fr.dist1=transform(fr.dist,z=log10(x))
fr.dist1
```

```
      x f      z
1     2 1 0.3010300
2     3 2 0.4771213
3     4 3 0.6020600
4     5 4 0.6989700
5     6 5 0.7781513
6     7 6 0.8450980
7     8 5 0.9030900
8     9 4 0.9542425
9    10 3 1.0000000
10   11 2 1.0413927
11   12 1 1.0791812
```

```
attach(fr.dist1)
```

The following objects are masked _by_ .GlobalEnv:

```
f, x, z
```

```
logg1=(sum(f*z)/sum(f))
```

Warning in f * z: longer object length is not a multiple of shorter object length

```
logg1
```

```
[1] 0.08824423
```

```
GM=10logg1
GM
```

```
[1] 1.225305
```

```
# Harmonic mean
fr.dist2=transform(fr.dist1,w=1/x)
fr.dist2
```

	x	f	z	w
1	2	1	0.3010300	0.50000000
2	3	2	0.4771213	0.33333333
3	4	3	0.6020600	0.25000000
4	5	4	0.6989700	0.20000000
5	6	5	0.7781513	0.16666667
6	7	6	0.8450980	0.14285714
7	8	5	0.9030900	0.12500000
8	9	4	0.9542425	0.11111111
9	10	3	1.0000000	0.10000000
10	11	2	1.0413927	0.09090909
11	12	1	1.0791812	0.08333333

```
attach(fr.dist2)
```

The following objects are masked `_by_ .GlobalEnv:`

```
f, x, z
```

The following objects are masked from `fr.dist1:`

```
f, x, z
```

```
HM=(sum(f))/(sum(f*w))
HM
```

```
[1] 5.95855
```

Grouped frequency (continuous data)

```
x=seq(147.5, 182.5,5) #Mid values
x
```

```
[1] 147.5 152.5 157.5 162.5 167.5 172.5 177.5 182.5
```

```
f=c(4,6,28,58,64,30,5,5)
f
```

```
[1] 4 6 28 58 64 30 5 5
```

```
fr.dist=data.frame(x,f)
fr.dist
```

```
      x  f
1 147.5  4
2 152.5  6
3 157.5 28
4 162.5 58
5 167.5 64
6 172.5 30
7 177.5  5
8 182.5  5
```

```
#Geometric mean
y=log(x,10)
logg=sum(f*y)/sum(f)

logg
```

```
[1] 2.217605
```

```
geo=10logg
geo
```

```
[1] 165.0461
```

```
#Harmonic mean
z=1/x
h=sum(f)/sum(z*f)
h
```

```
[1] 164.9168
```