HW 11

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Question 1

```
x <- 5 + 8i
y <- -6 + 7i

u <- x + y
v <- x * y
w <- x / y
z <- exp(x)
r <- sqrt(y)
s <- x*y^2

u
```

```
## [1] -1+15i
```

```
v
```

```
## [1] -86-13i
```

```
w
```

```
## [1] 0.3058824-0.9764706i
```

```
z
```

```
## [1] -21.5941+146.8338i
```

```
r
```

```
## [1] 1.268768+2.758582i
```

```
s
```

```
## [1] 607-524i
```

Question 2

```
a2 <- (3+6i)*(-7-9i)
b2 <- (5+4i)/(5-4i)
c2 <- 3/2i

a2
```

```
## [1] 33-69i
```

```
b2
```

```
## [1] 0.2195122+0.9756098i
```

```
c2
```

```
## [1] 0-1.5i
```

Question 3

```
a3 <- exp(-2.1^3) + 3.47*log10(14) + 287^(1/4)
b3 <- (3.4)^7*log10(14) + 287^(1/4)
c3 <- cos((4.12*pi)/6)^2
d3 <- cos(((4.12*pi)/6)^2)

a3
```

```
## [1] 8.093113
```

```
b3
```

```
## [1] 6023.964
```

```
c3
```

```
## [1] 0.3062422
```

```
d3
```

```
## [1] -0.05872703
```

Question 4

```
x4 <- 6
a4 <- (x4 < 10)
b4 <- (x4 == 10)
c4 <- (x4 >= 4)
d4 <- (x4 != 7)

a4
```

```
## [1] TRUE
```

```
b4
```

```
## [1] FALSE
```

```
c4
```

```
## [1] TRUE
```

```
d4
```

```
## [1] TRUE
```

Question 5

```
a5 <- 6 > 3+8
b5 <- 6+3 > 8
c5 <- 4 > (2+9)
d5 <- (4 < 7) + 3
e5 <- 4 < 7 + 3
f5 <- (4 < 7) * 5
g5 <- 4 < (7*5)
h5 <- 2/5 >= 5

a5
```

```
## [1] FALSE
```

```
b5
```

```
## [1] TRUE
```

```
c5
```

```
## [1] FALSE
```

```
d5
```

```
## [1] 4
```

```
e5
```

```
## [1] TRUE
```

```
f5
```

```
## [1] 5
```

```
g5
```

```
## [1] TRUE
```

```
h5
```

```
## [1] FALSE
```

Question 6

```
A <- matrix(c(3,-5,6,15,7,9,13,5,-4,10,8,4,12,2,11,1), nrow=4)
A
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    3    7   -4   12
## [2,]   -5    9   10    2
## [3,]    6   13    8   11
## [4,]   15    5    4    1
```

```
V <- A[1:4,2]
W <- A[2,1:4]

V
```

```
## [1]  7  9 13  5
```

```
W
```

```
## [1] -5  9 10  2
```

Question 7

```
a7 <- rnorm(20,10,5)
a7 <- sort(a7)
a7
```

```
##  [1] -1.672414  3.515623  5.539137  5.603443  8.935031  9.272157 10.160996
##  [8] 10.608185 11.374675 11.444480 11.603954 11.608780 13.097137 13.404505
## [15] 15.186017 15.857449 17.078671 17.509025 17.798375 17.914957
```

```
a7 <- a7[-c(1,2,19,20)]
a7
```

```
##  [1]  5.539137  5.603443  8.935031  9.272157 10.160996 10.608185 11.374675
##  [8] 11.444480 11.603954 11.608780 13.097137 13.404505 15.186017 15.857449
```

```
## [15] 17.078671 17.509025
```

Question 8

```
temp <- read.csv('temperature.csv')

# temperature stats
mean(temp$temperature)
```

```
## [1] 14.95647
```

```
max(temp$temperature)
```

```
## [1] 36.8
```

```
min(temp$temperature)
```

```
## [1] -6.8
```

```
sd(temp$temperature)
```

```
## [1] 6.40563
```

```
var(temp$temperature)
```

```
## [1] 41.03209
```

```
range(temp$temperature)
```

```
## [1] -6.8 36.8
```

```
# rainfall stats
mean(temp$rain)
```

```
## [1] 1.832334
```

```
max(temp$rain)
```

```
## [1] 59.5
```

```
min(temp$rain)
```

```
## [1] 0
```

```
sd(temp$rain)
```

```
## [1] 4.072647
```

```
var(temp$rain)
```

```
## [1] 16.58646
```

```
range(temp$rain)
```

```
## [1]  0.0 59.5
```

Question 9

```
temp_yr_avg <- tapply(temp$temperature, temp$yr, mean)
# warmest year
which.max(temp_yr_avg)
```

```
## 2003
##   17
```

```
# coldest year
which.min(temp_yr_avg)
```

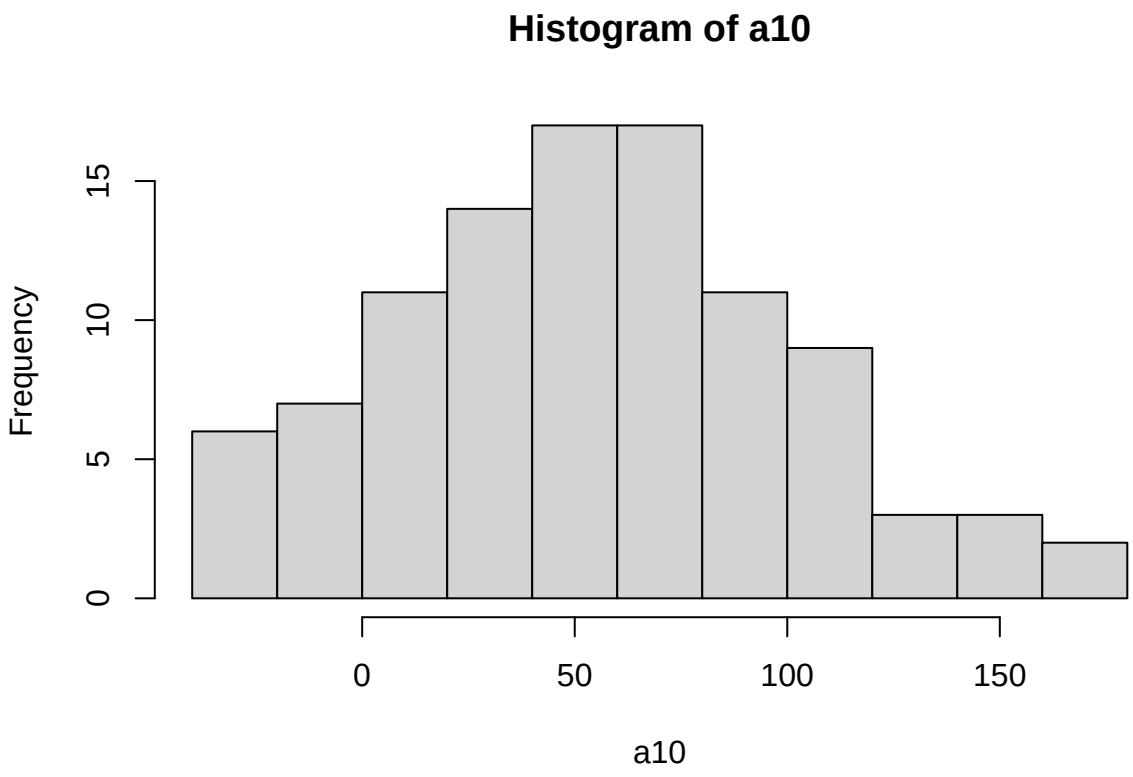
```
## 1987
##    1
```

Question 10

```
a10 <- rnorm(100,50,50)
a10
```

```
##   [1] -12.2567652 108.7121384  -9.1974392  80.5128796  57.2272351  75.3296129
##   [7]  33.5352430  65.7743300 111.3147885  71.1121015 -39.1679840  65.6652424
##  [13] 107.3850755  70.2763116  79.5456356 -13.7896067  55.6232800 113.2925861
##  [19]  23.9278793  48.4600558 106.1575873  43.0014173 -28.2936712 -33.5949533
##  [25] 129.1327025  29.2253025   5.9561311  23.0880052  28.8893366  69.8070840
##  [31] 141.5327805 -13.5230133  48.0777081  25.8455776 139.2719745 -29.7881478
##  [37]  28.7560189  64.1391716  49.5829748  75.9682996 -23.1518424  88.8415090
##  [43]  96.5991518  81.7530617 -23.6067431  35.6700382  69.8218282  11.4681547
##  [49]  -6.1422178 113.3697636  57.1620583  44.5015341  35.8082491  97.4041853
##  [55]  99.9497207  80.5665031 106.6324712  15.5782796  95.0421981  53.4346820
##  [61]  66.0881251 104.6613068   9.2893082  50.4953210  77.9217142   6.4562404
##  [67]  13.8558473  14.6769598  77.4178036  30.7410283  30.7845380 116.7648555
##  [73]  82.5465788  25.9731391 140.3341110  75.1609918 169.8449135   0.5765677
##  [79]  92.6378371  83.7691025  60.1886369   3.5169501  65.1092570 169.5210798
##  [85] 125.8836842   8.8143741 -17.0298937  52.1888391  40.2180306 157.5549299
##  [91]  57.8196950  58.5377247  55.6003392  68.3479518  47.3093914  45.6794167
##  [97]  -2.6927684   9.9737112  31.2359436  35.6753725
```

```
hist(a10)
```



```r
#min(abs(a10-100))
which(abs(a10-100) == min(abs(a10-100)))
```

```
## [1] 55
```