1. What command in R would give you the answer to \((\frac{(1+2+3+4)}{5+4})^2\)?
\(((1+2)/(3+4))^2\).

2. If `fun <- function(x,y,z){x+y^2+z^3}` what would `fun(c(3,5),3,1)` give you?
3 + 3^2 + 1^3 = 13 and 5 + 3^2 + 1^3 = 15.

3. What would the command `rm(list=ls(pattern="ex"))` do?
It would remove all objects in the workspace containing `ex` in their names.

4. What is the result of the command `seq(4,0,-1.5)`?
4.0 2.5 1.0

5. State the results for the following two commands:
Inf+Inf and Inf-Inf
Inf and NaN, respectively.

6. If `x <- c(1,2,NA)` and `y <- c(NA,2,3)` what does `is.na(x) == is.na(y)` produce?
FALSE TRUE FALSE

7. If `Mat <- matrix(1:8,ncol=4,byrow=FALSE)`, what is `Mat[2,3]`?
6

8. What is `rev(1:20)[1:3]`?
20 19 18

9. What are the results of `(5 > 1) * (1 < 5)` and `(5 > 1) & (1 < 5)`, respectively?
1 and TRUE respectively.

10. For `x <- c(4,7)` state the results for each of the following 3 commands
rep(x,each=2), rep(x,times=2), rep(x,length.out=5)?
4 4 7 7
4 7 4 7
gives 4 7 4 7 4

11. If `x <- 1:6` and `x[x!=5] <- 0`, what is the final result of `x`?
0 0 0 5 0

12. What is the result of `which(1:6 > 5)`?
6

13. What is the significance of the arguments `pch`, `xlim`, and `ylab` in the command
plot(x,y,pch=16,xlim=c(0,15),ylim=c(2,5),xlab="x",ylab="R")
pch controls the plotting character (here a bullet). xlim=c(0,15) controls the x range of the plot to [0,15], and ylab="R" labels the y-axis with R.

14. Explain the spike near zero for the EMS response times.
It can be explained by the EMS unit being on road while receiving the dispatch call. They are already out the door.

15. R is capable to plot in \(N\) different colors. Circle the answer closest to \(N\)?
a) 20  b) 100  c) 200  d)500  e) 650
`length(colors())` gives 657, i.e. e) comes closest.
16. In what context is `qqline(x)` used and how is it constructed (roughly)?

`qqline(x)` is used typically after `qqnorm(x)` and it draws a line through the normal QQ-plot, connecting roughly the first and third quantiles of the sample and the standard normal distribution.

17. What determines the position of the upper adjacent value in a boxplot?

It is the largest sample value \( \leq Q_{.75} + 1.5 \times IQR \).

18. Describe the context for the command `text(...)` and what is its purpose?

It is used to add text annotations to a plot.

19. What argument needs to be specified in the `hist(...)` command to make it suitable for comparing it to a density?

`probability=T` makes sure that the box areas sum to 1, thus making a comparison to a density reasonable.

20. What do the following commands accomplish?

```r
mat <- matrix(12:1, byrow=FALSE, ncol=3)
write.csv(mat, "mat.csv", row.names=F)
```

It writes the \( 4 \times 3 \) matrix (filled by column with 12, 11, \ldots, 1) to the `.csv` file `mat.csv`, without row numbers.

The scores are shown below in histogram form. The two highest scores were 96 and 95.