> # loading the air quality dataset (after downloading it)

> data(airquality)

> print("The structure of the airquality dataset:")

[1] "The structure of the airquality dataset:"

> str(airquality)

'data.frame': 153 obs. of 6 variables:

$ Ozone : int 41 36 12 18 NA 28 23 19 8 NA ...

$ Solar.R: int 190 118 149 313 NA NA 299 99 19 194 ...

$ Wind : num 7.4 8 12.6 11.5 14.3 14.9 8.6 13.8 20.1 8.6 ...

$ Temp : int 67 72 74 62 56 66 65 59 61 69 ...

$ Month : int 5 5 5 5 5 5 5 5 5 5 ...

$ Day : int 1 2 3 4 5 6 7 8 9 10 ...

> cat("\n")

> print("The No. of observations and variables in the airquality dataset:")

[1] "The No. of observations and variables in the airquality dataset:"

> dim(airquality)

[1] 153 6

> cat("\n")

> print("The count of complete rows in the airquality dataset:")

[1] "The count of complete rows in the airquality dataset:"

> complete\_rows <- na.omit(airquality)

> nrow(complete\_rows)

[1] 111

> cat("\n")

> print("The data for the observation having Temp b/w 70 and 80:")

[1] "The data for the observation having Temp b/w 70 and 80:"

> (temp\_70\_to\_80 <- subset(airquality, Temp >= 70 & Temp <= 80))

Ozone Solar.R Wind Temp Month Day

2 36 118 8.0 72 5 2

3 12 149 12.6 74 5 3

11 7 NA 6.9 74 5 11

22 11 320 16.6 73 5 22

30 115 223 5.7 79 5 30

31 37 279 7.4 76 5 31

32 NA 286 8.6 78 6 1

33 NA 287 9.7 74 6 2

37 NA 264 14.3 79 6 6

45 NA 332 13.8 80 6 14

46 NA 322 11.5 79 6 15

47 21 191 14.9 77 6 16

48 37 284 20.7 72 6 17

50 12 120 11.5 73 6 19

51 13 137 10.3 76 6 20

52 NA 150 6.3 77 6 21

53 NA 59 1.7 76 6 22

54 NA 91 4.6 76 6 23

55 NA 250 6.3 76 6 24

56 NA 135 8.0 75 6 25

57 NA 127 8.0 78 6 26

58 NA 47 10.3 73 6 27

59 NA 98 11.5 80 6 28

60 NA 31 14.9 77 6 29

73 10 264 14.3 73 7 12

76 7 48 14.3 80 7 15

82 16 7 6.9 74 7 21

106 65 157 9.7 80 8 14

107 NA 64 11.5 79 8 15

108 22 71 10.3 77 8 16

109 59 51 6.3 79 8 17

110 23 115 7.4 76 8 18

111 31 244 10.9 78 8 19

112 44 190 10.3 78 8 20

113 21 259 15.5 77 8 21

114 9 36 14.3 72 8 22

115 NA 255 12.6 75 8 23

116 45 212 9.7 79 8 24

130 20 252 10.9 80 9 7

131 23 220 10.3 78 9 8

132 21 230 10.9 75 9 9

133 24 259 9.7 73 9 10

135 21 259 15.5 76 9 12

136 28 238 6.3 77 9 13

137 9 24 10.9 71 9 14

138 13 112 11.5 71 9 15

139 46 237 6.9 78 9 16

141 13 27 10.3 76 9 18

145 23 14 9.2 71 9 22

149 30 193 6.9 70 9 26

150 NA 145 13.2 77 9 27

151 14 191 14.3 75 9 28

152 18 131 8.0 76 9 29

> cat("\n")

> print("The count of observations where Month = 5:")

[1] "The count of observations where Month = 5:"

> (count\_month\_5 <- sum(airquality$Month == 5, na.rm = TRUE))

[1] 31

> cat("\n")

> #or this

> (nrow(subset(airquality,Month==5)))

[1] 31

> print("The first 10 rows of the airquality dataset:")

[1] "The first 10 rows of the airquality dataset:"

> first\_10\_rows <- head(airquality, n = 10)

> print(first\_10\_rows)

Ozone Solar.R Wind Temp Month Day

1 41 190 7.4 67 5 1

2 36 118 8.0 72 5 2

3 12 149 12.6 74 5 3

4 18 313 11.5 62 5 4

5 NA NA 14.3 56 5 5

6 28 NA 14.9 66 5 6

7 23 299 8.6 65 5 7

8 19 99 13.8 59 5 8

9 8 19 20.1 61 5 9

10 NA 194 8.6 69 5 10

> cat("\n")

> print("The summary of Wind variable:")

[1] "The summary of Wind variable:"

> wind\_summary <- summary(airquality$Wind)

> print(wind\_summary)

Min. 1st Qu. Median Mean 3rd Qu. Max.

1.700 7.400 9.700 9.958 11.500 20.700

> cat("\n")

> print("The airquality dataset sorted in decreasing order of Temp variable:")

[1] "The airquality dataset sorted in decreasing order of Temp variable:"

> sorted\_airquality <- airquality[order(-airquality$Temp),]

> print(sorted\_airquality)

Ozone Solar.R Wind Temp Month Day

120 76 203 9.7 97 8 28

122 84 237 6.3 96 8 30

121 118 225 2.3 94 8 29

123 85 188 6.3 94 8 31

42 NA 259 10.9 93 6 11

126 73 183 2.8 93 9 3

127 91 189 4.6 93 9 4

43 NA 250 9.2 92 6 12

69 97 267 6.3 92 7 8

70 97 272 5.7 92 7 9

102 NA 222 8.6 92 8 10

125 78 197 5.1 92 9 2

75 NA 291 14.9 91 7 14

124 96 167 6.9 91 9 1

40 71 291 13.8 90 6 9

100 89 229 10.3 90 8 8

101 110 207 8.0 90 8 9

71 85 175 7.4 89 7 10

99 122 255 4.0 89 8 7

68 77 276 5.1 88 7 7

89 82 213 7.4 88 7 28

119 NA 153 5.7 88 8 27

39 NA 273 6.9 87 6 8

41 39 323 11.5 87 6 10

80 79 187 5.1 87 7 19

98 66 NA 4.6 87 8 6

128 47 95 7.4 87 9 5

85 80 294 8.6 86 7 24

88 52 82 12.0 86 7 27

90 50 275 7.4 86 7 29

96 78 NA 6.9 86 8 4

103 NA 137 11.5 86 8 11

104 44 192 11.5 86 8 12

118 73 215 8.0 86 8 26

36 NA 220 8.6 85 6 5

63 49 248 9.2 85 7 2

81 63 220 11.5 85 7 20

86 108 223 8.0 85 7 25

97 35 NA 7.4 85 8 5

35 NA 186 9.2 84 6 4

62 135 269 4.1 84 7 1

65 NA 101 10.9 84 7 4

79 61 285 6.3 84 7 18

129 32 92 15.5 84 9 6

61 NA 138 8.0 83 6 30

66 64 175 4.6 83 7 5

67 40 314 10.9 83 7 6

91 64 253 7.4 83 7 30

38 29 127 9.7 82 6 7

44 23 148 8.0 82 6 13

72 NA 139 8.6 82 7 11

78 35 274 10.3 82 7 17

84 NA 295 11.5 82 7 23

87 20 81 8.6 82 7 26

95 16 77 7.4 82 8 3

105 28 273 11.5 82 8 13

143 16 201 8.0 82 9 20

29 45 252 14.9 81 5 29

64 32 236 9.2 81 7 3

74 27 175 14.9 81 7 13

77 48 260 6.9 81 7 16

83 NA 258 9.7 81 7 22

92 59 254 9.2 81 7 31

93 39 83 6.9 81 8 1

94 9 24 13.8 81 8 2

117 168 238 3.4 81 8 25

134 44 236 14.9 81 9 11

146 36 139 10.3 81 9 23

45 NA 332 13.8 80 6 14

59 NA 98 11.5 80 6 28

76 7 48 14.3 80 7 15

106 65 157 9.7 80 8 14

130 20 252 10.9 80 9 7

30 115 223 5.7 79 5 30

37 NA 264 14.3 79 6 6

46 NA 322 11.5 79 6 15

107 NA 64 11.5 79 8 15

109 59 51 6.3 79 8 17

116 45 212 9.7 79 8 24

32 NA 286 8.6 78 6 1

57 NA 127 8.0 78 6 26

111 31 244 10.9 78 8 19

112 44 190 10.3 78 8 20

131 23 220 10.3 78 9 8

139 46 237 6.9 78 9 16

47 21 191 14.9 77 6 16

52 NA 150 6.3 77 6 21

60 NA 31 14.9 77 6 29

108 22 71 10.3 77 8 16

113 21 259 15.5 77 8 21

136 28 238 6.3 77 9 13

150 NA 145 13.2 77 9 27

31 37 279 7.4 76 5 31

51 13 137 10.3 76 6 20

53 NA 59 1.7 76 6 22

54 NA 91 4.6 76 6 23

55 NA 250 6.3 76 6 24

110 23 115 7.4 76 8 18

135 21 259 15.5 76 9 12

141 13 27 10.3 76 9 18

152 18 131 8.0 76 9 29

56 NA 135 8.0 75 6 25

115 NA 255 12.6 75 8 23

132 21 230 10.9 75 9 9

151 14 191 14.3 75 9 28

3 12 149 12.6 74 5 3

11 7 NA 6.9 74 5 11

33 NA 287 9.7 74 6 2

82 16 7 6.9 74 7 21

22 11 320 16.6 73 5 22

50 12 120 11.5 73 6 19

58 NA 47 10.3 73 6 27

73 10 264 14.3 73 7 12

133 24 259 9.7 73 9 10

2 36 118 8.0 72 5 2

48 37 284 20.7 72 6 17

114 9 36 14.3 72 8 22

137 9 24 10.9 71 9 14

138 13 112 11.5 71 9 15

145 23 14 9.2 71 9 22

149 30 193 6.9 70 9 26

10 NA 194 8.6 69 5 10

12 16 256 9.7 69 5 12

147 7 49 10.3 69 9 24

14 14 274 10.9 68 5 14

19 30 322 11.5 68 5 19

142 24 238 10.3 68 9 19

153 20 223 11.5 68 9 30

1 41 190 7.4 67 5 1

28 23 13 12.0 67 5 28

34 NA 242 16.1 67 6 3

140 18 224 13.8 67 9 17

6 28 NA 14.9 66 5 6

13 11 290 9.2 66 5 13

17 34 307 12.0 66 5 17

7 23 299 8.6 65 5 7

49 20 37 9.2 65 6 18

16 14 334 11.5 64 5 16

144 13 238 12.6 64 9 21

148 14 20 16.6 63 9 25

4 18 313 11.5 62 5 4

20 11 44 9.7 62 5 20

9 8 19 20.1 61 5 9

23 4 25 9.7 61 5 23

24 32 92 12.0 61 5 24

8 19 99 13.8 59 5 8

21 1 8 9.7 59 5 21

15 18 65 13.2 58 5 15

26 NA 266 14.9 58 5 26

18 6 78 18.4 57 5 18

25 NA 66 16.6 57 5 25

27 NA NA 8.0 57 5 27

5 NA NA 14.3 56 5 5

> cat("\n")

> #or this

> (airquality[order(airquality$Temp,decreasing = TRUE),])

Ozone Solar.R Wind Temp Month Day

120 76 203 9.7 97 8 28

122 84 237 6.3 96 8 30

121 118 225 2.3 94 8 29

123 85 188 6.3 94 8 31

42 NA 259 10.9 93 6 11

126 73 183 2.8 93 9 3

127 91 189 4.6 93 9 4

43 NA 250 9.2 92 6 12

69 97 267 6.3 92 7 8

70 97 272 5.7 92 7 9

102 NA 222 8.6 92 8 10

125 78 197 5.1 92 9 2

75 NA 291 14.9 91 7 14

124 96 167 6.9 91 9 1

40 71 291 13.8 90 6 9

100 89 229 10.3 90 8 8

101 110 207 8.0 90 8 9

71 85 175 7.4 89 7 10

99 122 255 4.0 89 8 7

68 77 276 5.1 88 7 7

89 82 213 7.4 88 7 28

119 NA 153 5.7 88 8 27

39 NA 273 6.9 87 6 8

41 39 323 11.5 87 6 10

80 79 187 5.1 87 7 19

98 66 NA 4.6 87 8 6

128 47 95 7.4 87 9 5

85 80 294 8.6 86 7 24

88 52 82 12.0 86 7 27

90 50 275 7.4 86 7 29

96 78 NA 6.9 86 8 4

103 NA 137 11.5 86 8 11

104 44 192 11.5 86 8 12

118 73 215 8.0 86 8 26

36 NA 220 8.6 85 6 5

63 49 248 9.2 85 7 2

81 63 220 11.5 85 7 20

86 108 223 8.0 85 7 25

97 35 NA 7.4 85 8 5

35 NA 186 9.2 84 6 4

62 135 269 4.1 84 7 1

65 NA 101 10.9 84 7 4

79 61 285 6.3 84 7 18

129 32 92 15.5 84 9 6

61 NA 138 8.0 83 6 30

66 64 175 4.6 83 7 5

67 40 314 10.9 83 7 6

91 64 253 7.4 83 7 30

38 29 127 9.7 82 6 7

44 23 148 8.0 82 6 13

72 NA 139 8.6 82 7 11

78 35 274 10.3 82 7 17

84 NA 295 11.5 82 7 23

87 20 81 8.6 82 7 26

95 16 77 7.4 82 8 3

105 28 273 11.5 82 8 13

143 16 201 8.0 82 9 20

29 45 252 14.9 81 5 29

64 32 236 9.2 81 7 3

74 27 175 14.9 81 7 13

77 48 260 6.9 81 7 16

83 NA 258 9.7 81 7 22

92 59 254 9.2 81 7 31

93 39 83 6.9 81 8 1

94 9 24 13.8 81 8 2

117 168 238 3.4 81 8 25

134 44 236 14.9 81 9 11

146 36 139 10.3 81 9 23

45 NA 332 13.8 80 6 14

59 NA 98 11.5 80 6 28

76 7 48 14.3 80 7 15

106 65 157 9.7 80 8 14

130 20 252 10.9 80 9 7

30 115 223 5.7 79 5 30

37 NA 264 14.3 79 6 6

46 NA 322 11.5 79 6 15

107 NA 64 11.5 79 8 15

109 59 51 6.3 79 8 17

116 45 212 9.7 79 8 24

32 NA 286 8.6 78 6 1

57 NA 127 8.0 78 6 26

111 31 244 10.9 78 8 19

112 44 190 10.3 78 8 20

131 23 220 10.3 78 9 8

139 46 237 6.9 78 9 16

47 21 191 14.9 77 6 16

52 NA 150 6.3 77 6 21

60 NA 31 14.9 77 6 29

108 22 71 10.3 77 8 16

113 21 259 15.5 77 8 21

136 28 238 6.3 77 9 13

150 NA 145 13.2 77 9 27

31 37 279 7.4 76 5 31

51 13 137 10.3 76 6 20

53 NA 59 1.7 76 6 22

54 NA 91 4.6 76 6 23

55 NA 250 6.3 76 6 24

110 23 115 7.4 76 8 18

135 21 259 15.5 76 9 12

141 13 27 10.3 76 9 18

152 18 131 8.0 76 9 29

56 NA 135 8.0 75 6 25

115 NA 255 12.6 75 8 23

132 21 230 10.9 75 9 9

151 14 191 14.3 75 9 28

3 12 149 12.6 74 5 3

11 7 NA 6.9 74 5 11

33 NA 287 9.7 74 6 2

82 16 7 6.9 74 7 21

22 11 320 16.6 73 5 22

50 12 120 11.5 73 6 19

58 NA 47 10.3 73 6 27

73 10 264 14.3 73 7 12

133 24 259 9.7 73 9 10

2 36 118 8.0 72 5 2

48 37 284 20.7 72 6 17

114 9 36 14.3 72 8 22

137 9 24 10.9 71 9 14

138 13 112 11.5 71 9 15

145 23 14 9.2 71 9 22

149 30 193 6.9 70 9 26

10 NA 194 8.6 69 5 10

12 16 256 9.7 69 5 12

147 7 49 10.3 69 9 24

14 14 274 10.9 68 5 14

19 30 322 11.5 68 5 19

142 24 238 10.3 68 9 19

153 20 223 11.5 68 9 30

1 41 190 7.4 67 5 1

28 23 13 12.0 67 5 28

34 NA 242 16.1 67 6 3

140 18 224 13.8 67 9 17

6 28 NA 14.9 66 5 6

13 11 290 9.2 66 5 13

17 34 307 12.0 66 5 17

7 23 299 8.6 65 5 7

49 20 37 9.2 65 6 18

16 14 334 11.5 64 5 16

144 13 238 12.6 64 9 21

148 14 20 16.6 63 9 25

4 18 313 11.5 62 5 4

20 11 44 9.7 62 5 20

9 8 19 20.1 61 5 9

23 4 25 9.7 61 5 23

24 32 92 12.0 61 5 24

8 19 99 13.8 59 5 8

21 1 8 9.7 59 5 21

15 18 65 13.2 58 5 15

26 NA 266 14.9 58 5 26

18 6 78 18.4 57 5 18

25 NA 66 16.6 57 5 25

27 NA NA 8.0 57 5 27

5 NA NA 14.3 56 5 5

> print("Adding a new observation to the airquality dataset:")

[1] "Adding a new observation to the airquality dataset:"

> new\_observation <- data.frame(Ozone = 10, Solar.R = 200, Wind = 8, Temp = 75, Month = 8, Day = 31)

> airquality <- rbind(airquality, new\_observation)

> cat("\n")