1

Q1

```
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.3     v readr     2.1.4
## v forcats   1.0.0     v stringr   1.5.0
## v ggplot2   3.4.3     v tibble    3.2.1
## v lubridate 1.9.3     v tidyr     1.3.0
## v purrr     1.0.2
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(Stat2Data)
library(dplyr)
data("Hawks")
filter(Hawks, Species == 'RT' & Weight >= 1000)
```

```
##     Month Day Year CaptureTime ReleaseTime  BandNumber Species Age Sex  Wing
## 1       9  28 1992       11:25             1207-55910       RT   I     412.0
## 2       9  29 1992       15:35               877-76322      RT   A     412.0
## 3       9  30 1992       13:45              1207-55911      RT   I     405.0
## 4      10   5 1992       13:30               877-76323      RT   I     393.0
## 5      10   8 1992       13:45               877-76324      RT   I     371.0
## 6      10   9 1992       12:30               877-76325      RT   A     390.0
## 7      10  11 1992       11:00              1207-55912      RT   I     416.0
## 8      10  11 1992       11:45              1207-55913      RT   A     436.0
## 9      10  11 1992       12:40               877-76326      RT   I     418.0
## 10     10  13 1992       11:00               877-76329      RT   I     396.0
## 11     10  13 1992       14:50               877-76330      RT   I     399.0
## 12     10  14 1992       13:15               877-76331      RT   I     416.0
## 13     10  22 1992       13:05               877-76333      RT   A     392.0
## 14     10  24 1992       14:35               877-76335      RT   I     399.0
## 15     10  25 1992       12:05              1207-55914      RT   A     401.0
## 16     10  27 1992       10:45               608-48703      RT   I     427.0
## 17     10  27 1992       15:15              1207-55915      RT   A     395.0
## 18     11   3 1992       10:15              1207-55916      RT   A     396.0
## 19     11   8 1992       11:45              1207-55918      RT   A     391.0
## 20     11   8 1992       13:30              1207-55919      RT   A     413.0
## 21     11  13 1992       10:45               987-53707      RT   A     371.0
## 22     11  16 1992       11:15              1207-55920      RT   A     385.0
## 23     11  21 1992       14:00               877-76337      RT   A     378.0
## 24     11  22 1992       10:08              1207-55921      RT   A     416.0
## 25      9  21 1993       15:11               877-76339      RT   I     384.0
## 26      9  22 1993       13:50               877-76340      RT   I     382.0
## 27      9  22 1993       15:55               877-76341      RT   I     390.0
## 28      9  27 1993       12:15               877-76342      RT   I     390.0
## 29      9  27 1993       13:00               877-76344      RT   I     393.0
## 30      9  27 1993       13:20               877-76345      RT   I     378.0
## 31      9  27 1993       15:03               877-76346      RT   I     398.0
## 32      9  28 1993       11:50               877-76347      RT   I     412.0
```

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## 33      9  29 1993        9:53          877-76349      RT   I     422.0
## 34      9  29 1993       15:30          877-76350      RT   I     394.0
## 35     10   3 1993       13:35         1207-55922      RT   I     410.0
## 36     10   4 1993       11:25         1207-55923      RT   I     241.0
## 37     10   7 1993       14:40         1207-55924      RT   I     408.0
## 38     10   9 1993        9:38          877-76351      RT   I      37.2
## 39     10  10 1993       11:25         1207-55927      RT   I     396.0
## 40     10  11 1993       14:00          877-76354      RT   I     416.0
## 41     10  21 1993        9:20          877-76355      RT   A     390.0
## 42     10  21 1993       15:30          877-76357      RT   A     391.0
## 43     10  22 1993       16:35          877-76358      RT   A     387.0
## 44     10  23 1993       13:05         1207-55941      RT   I     420.0
## 45     10  25 1993       14:12          877-76359      RT   A     435.0
## 46     10  26 1993       15:55          877-76360      RT   A     400.0
## 47     10  31 1993       11:35         1207-55947      RT   I     398.0
## 48     11   5 1993       11:00          877-76361      RT   I     395.0
## 49     11  18 1993       10:37          877-76362      RT   I     410.0
## 50      9   6 1994        9:55         1387-99101      RT   I     369.0
## 51      9   7 1994       12:27         1387-99104      RT   I     415.0
## 52      9   7 1994       13:35         1387-99103      RT   I     412.0
## 53      9  12 1994       13:50         1387-97105      RT   I     375.0
## 54      9  13 1994       11:58         1387-79106      RT   I     385.0
## 55      9  15 1994       12:45         1207-64601      RT   I     422.0
## 56      9  15 1994       13:20         1387-79107      RT   I     391.0
## 57      9  15 1994       13:35         1387-79108      RT   I     410.0
## 58      9  16 1994       11:20         1387-79111      RT   I     381.0
## 59      8  18 1994       12:05         1207-64602      RT   A     416.0
## 60      9  18 1994       13:20         1207-64603      RT   I     406.0
## 61      9  19 1994       12:58         1207-64604      RT   I     418.0
## 62      9  19 1994       14:05         1207-64605      RT   I     412.0
## 63      9  29 1994       13:55         1387-79112      RT   I     405.0
## 64      9  26 1994       12:10         1207-64606      RT   I     428.0
## 65      9  27 1994       15:40         1307-79115      RT   I     381.0
## 66      9  30 1994       10:39         1207-64608      RT   I     420.0
## 67     10   4 1994       14:45         1207-64609      RT   I     395.0
## 68     10   5 1994       13:55         1207-64610      RT   I     406.0
## 69     10   5 1994       15:17         1207-64611      RT   I     414.0
## 70     10   7 1994       12:15         1207-64612      RT   I     423.0
## 71     10   7 1994       15:40         1387-79125      RT   I     365.0
## 72     10  10 1994       11:02         1387-79127      RT   I     391.0
## 73     10  10 1994       12:23         1387-79129      RT   I     392.0
## 74     10  10 1994       13:50         1207-64613      RT   I     410.0
## 75     10  13 1994       13:05         1207-64614      RT   I     422.0
## 76     10  13 1994       14:00         1387-79131      RT   I     385.0
## 77     10  16 1994       12:05         1387-79132      RT   I     363.0
## 78     10  16 1994       11:30         1207-64615      RT   I     450.0
## 79     10  18 1994       13:30         1387-79135      RT   I     385.0
## 80     10  19 1994       11:27         1387-79137      RT   I     384.0
## 81     10  19 1994       13:35         1387-79140      RT   I     363.0
## 82     10  19 1994       13:50         1387-79141      RT   I     409.0
## 83     10  20 1994       12:00         1387-79142      RT   A     390.0
## 84     10  23 1994       11:06         1387-79143      RT   I     420.0
## 85     10  23 1994       11:36         1387-79144      RT   I     381.0
## 86     10  23 1994       13:09         1207-64616      RT   I     408.0
```

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## 87     10  23 1994       15:00            1387-79146      RT   A     398.0
## 88     10  25 1994       14:00           1387-079147      RT   A     394.0
## 89     10  26 1994       11:39            1387-79148      RT   I     394.0
## 90     10  26 1994       14:55            1207-64617      RT   I     416.0
## 91     10  26 1994       15:40            1207-64618      RT   I     445.0
## 92     10  27 1994       10:55            1387-79149      RT   I     388.0
## 93     10  27 1994       11:50            1387-79150      RT   I     397.0
## 94     10  27 1994       12:24            1387-79151      RT   I     384.0
## 95     10  27 1994       13:37            1387-79152      RT   I     379.0
## 96     10  28 1994       10:05            1387-79199      RT   I     393.0
## 97     10  28 1994       10:45            1387-79153      RT   I     386.0
## 98     10  29 1994       11:05            1387-79154      RT   I     397.0
## 99     10  29 1994       11:50            1387-79155      RT   I     382.0
## 100    11   1 1994       11:21            1387-79157      RT   I     417.0
## 101    11   2 1994       11:41            1387-79158      RT   I     403.0
## 102    11   2 1994       12:20            1207-64619      RT   I     401.0
## 103    11   2 1994       14:52            1387-79159      RT   A     377.0
## 104    11   6 1994        9:55            1207-64620      RT   A     432.0
## 105    11   6 1994       10:30            1207-64621      RT   I     390.0
## 106    11   6 1994       11:40            1387-79160      RT   I     381.0
## 107    11   7 1994       11:22            1387-79161      RT   I     403.0
## 108    11   9 1994       15:02            1807-53101      RT   I     390.0
## 109    11  11 1994       11:59            1387-79162      RT   A     386.0
## 110    11  11 1994       14:42            1387-79163      RT   I     402.0
## 111    11  15 1994       11:40            1387-79164      RT   A     374.0
## 112    11  16 1994       12:19            1387-79165      RT   I     370.0
## 113    11  21 1994       13:33            1387-79167      RT   I     398.0
## 114     9  13 1995       14:30            1207-64623      RT   A     375.0
## 115     9  17 1995       12:15            1387-79173      RT   I     409.0
## 116     9  18 1995       15:10            1207-64624      RT   I     415.0
## 117     9  23 1995       10:10            1387-79175      RT   I     381.0
## 118     9  26 1995       13:03            1387-79177      RT   I     398.0
## 119     9  26 1995       12:55            1207-64625      RT   I     412.0
## 120     9  27 1995       12:50            1387-79178      RT   I     411.0
## 121    10   1 1995       12:04            1207-64626      RT   I     415.0
## 122    10   1 1995       12:50            1387-79179      RT   I     383.0
## 123    10   3 1995       11:20            1387-79180      RT   I     390.0
## 124    10   4 1995       12:20            1387-79182      RT   A     365.0
## 125    10   4 1995       12:54            1387-79183      RT   A     345.0
## 126    10   6 1995       12:15            1207-64627      RT   I     400.0
## 127    10   6 1995       12:36            1207-64628      RT   I     380.0
## 128    10   6 1995       13:05            1207-79184      RT   I     330.0
## 129    10   6 1995       13:10            1207-64629      RT   I     410.0
## 130    10   9 1995       11:50            1207-64660      RT   I     409.0
## 131    10  10 1995       11:50            1207-64630      RT   I     411.0
## 132    10  11 1995       14:25            1387-79188      RT   A     380.0
## 133    10  11 1995       13:15            1387-79190      RT   I     415.0
## 134    10  12 1995       13:20            1387-79191      RT   I     410.0
## 135    10  12 1995       14:20            1387-79192      RT   I     412.0
## 136    10  13 1995       12:05            1207-64632      RT   I     404.0
## 137    10  13 1995       15:00            1387-79794      RT   I     410.0
## 138    10  14 1995       13:40            1387-79196      RT   I     398.0
## 139    10  15 1995       14:30            1387-79197      RT   I     425.0
## 140    10  15 1995       15:00            1397-79198      RT   I     401.0
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## 141    10  16 1995       12:35              1387-79172      RT   I     387.0
## 142    10  17 1995       11:45              1207-64635      RT   A     420.0
## 143    10  18 1995       13:05              2107-64631      RT   I     405.0
## 144    10  18 1995       12:02               877-76380      RT   I     398.0
## 145    10  20 1995       10:10              1207-64637      RT   A     410.0
## 146    11   2 1995       12:05              8777-63481      RT   A     382.0
## 147    11   2 1995       13:00              1207-64638      RT   I     111.0
## 148    11  20 1995       14:10              1207-64639      RT   I     396.0
## 149    11  21 1995       11:45               8777-6382      RT   I     363.0
## 150    10  10 1996       10:45              1207-64640      RT   I     390.0
## 151    10  10 1996       12:15              1207-64641      RT   A     390.0
## 152    10  18 1996       10:58              1207-64643      RT   A     415.0
## 153    10  24 1996       10:35              1387-92102      RT   A     417.0
## 154    10  24 1996       11:18              1387-92103      RT   I     379.0
## 155    10  25 1996       10:40              1207-64644      RT   A     412.0
## 156    10  30 1996        9:25                              RT   I     420.0
## 157    10  30 1996       11:30              1387-92106      RT   I     368.0
## 158    11   1 1996       14:05              1207-64645      RT   I     406.0
## 159     9   9 1997       12:01              1387-92125      RT   I     392.0
## 160     9  17 1997       13:04       13:45  1387-92128      RT   I     352.0
## 161     9  21 1997       11:55       12:07  1387-92129      RT   I     370.0
## 162     9  30 1997       12:10              1207-72602      RT   A     368.0
## 163     9  30 1997       12:50              1387-92134      RT   I     368.0
## 164    10   1 1997       11:58       12:27  1387-92136      RT   I     400.0
## 165    10   1 1997       12:57       13:14  1387-92139      RT   I     362.0
## 166    10   2 1997       11:52       12:05  1387-92140      RT   I     378.0
## 167    10   6 1997       14:08       14:37  1387-92141      RT   I     372.0
## 168    10   8 1997       10:00       10:25  1387-92142      RT   I     369.0
## 169    10   9 1997        9:57       11:07  1387-92144      RT   I     367.0
## 170    10   9 1997       13:27       13:57  1387-92146      RT   I     375.0
## 171    10   9 1997       14:58       15:15  1387-92148      RT   I     360.0
## 172    10  10 1997       11:45       12:00  1387-92149      RT   I     395.0
## 173    10  10 1997       11:55       12:08  1397-92150      RT   I     400.0
## 174    10  14 1997       11:52       12:05  1387-92151      RT   I     369.0
## 175    10  14 1997       14:15       14:30  1387-92152      RT   I     365.0
## 176    10  16 1997       13:05       13:25  1387-92153      RT   A     375.0
## 177    10  20 1997       11:21       11:35  1387-92154      RT   A     382.0
## 178    10  20 1997       12:49       13:05  1387-92155      RT   A     478.0
## 179    10  20 1997       13:05       13:20  1387-92157      RT   I     469.0
## 180    10  23 1997       12:10       12:36  1387-92158      RT   A     386.0
## 181    10  23 1997       14:36       15:03  1207-72603      RT   I     384.0
## 182    11   3 1997       12:15              1387-92159      RT   A     374.0
## 183    11  10 1997       12:30       12:49  1387-92160      RT   I     374.0
## 184    11  11 1997       11:10       11:35  1387-92161      RT   I     389.0
## 185    11  15 1997       12:54       13:08  1387-92162      RT   I     379.0
## 186     9  21 1998       11:45              1207-72604      RT   I     403.0
## 187    10   1 1998       10:42              1207-72606      RT   I     400.0
## 188    10   8 1998       10:45              1207-72607      RT   I     405.0
## 189    10   9 1998       12:10              1387-92174      RT   I     407.0
## 190    10   9 1998       12:25              1387-92175      RT   I     403.0
## 191    10  10 1998       11:00              1207-72608      RT   I     406.0
## 192    10  12 1998       10:15              1387-92177      RT   I     395.0
## 193    10  12 1998       11:45              1207-72609      RT   I     410.0
## 194    10  21 1998       10:40              1207-72610      RT   A     425.0
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## 195    10  26 1998       10:17            1387-92180      RT   A     480.0
## 196    11   2 1998       11:55             1207-72611      RT   A     381.0
## 197    11   4 1998       10:35             9387-92182      RT   I     382.0
## 198    11   9 1998        1:31             1387-92183      RT   A     391.0
## 199    11  11 1998       11:48             1207-72613      RT   A     397.0
## 200    11  11 1998       14:15             1387-92184      RT   I     376.0
## 201    11  12 1998       14:00            1207-726114      RT   A     410.0
## 202    11  18 1998       11:30             1207-72615      RT   I     381.0
## 203    11  19 1998       13:07             1387-92185      RT   I     396.0
## 204    11  20 1998       10:30             1387-92186      RT   I     383.0
## 205     9  18 1999       12:08             1207-72616      RT   I     395.0
## 206     9  18 1999       15:45             1387-92189      RT   I     370.0
## 207     9  23 1999       11:11             1207-72617      RT   I     391.0
## 208     9  24 1999       14:24             1387-92192      RT   I     364.0
## 209     9  25 1999       12:35             1387-92193      RT   I   M 381.0
## 210     9  26 1999       12:55             1387-92195      RT   I     392.0
## 211     9  29 1999       13:08             1207-72618      RT   A     398.0
## 212     9  30 1999       12:31             1387-19298      RT   A     367.0
## 213    10   4 1999       13:21             1387-19220      RT   I     408.0
## 214    10   5 1999       10:43             1177-04601      RT   I     399.0
## 215    10   7 1999       12:40             1207-72619      RT   I     388.0
## 216    10  11 1999       15:00             1177-04699      RT   I     370.0
## 217    10  12 1999       11:20             1177-04603      RT   I     371.0
## 218    10  14 1999        9:23             1177-04604      RT   I     386.0
## 219    10  14 1999        9:52             1207-72620      RT   I     400.0
## 220    10  14 1999       13:15             1177-04605      RT   I     390.0
## 221    10  15 1999       10:08             1177-14606      RT   A     382.0
## 222    10  15 1999       12:27             1177-04608      RT   I     403.0
## 223    10  15 1999       14:08             1177-04609      RT   I     375.0
## 224    10  15 1999       15:33             1177-04610      RT   I     368.0
## 225    10  16 1999       13:05             1177-04611      RT   A     393.0
## 226    10  20 1999       11:28             1177-04612      RT   I     370.0
## 227    10  23 1999       10:40             1207-72621      RT   A     410.0
## 228    10  25 1999       14:00             1207-72622      RT   A     410.0
## 229    11   1 1999       12:55             1207-72623      RT   I     390.0
## 230    11   2 1999       10:00             1207-72624      RT   A     404.0
## 231    11   2 1999       11:35             1177-04617      RT   I     375.0
## 232    11   3 1999       10:27             1207-72625      RT   I     395.0
## 233    11   3 1999       14:30             1177-04618      RT   I     379.0
## 234    11   4 1999       12:15             1207-72626      RT   I     382.0
## 235    11   4 1999       14:00             1207-72627      RT   I     404.0
## 236    11   5 1999       14:10             1177-04619      RT   A     377.0
## 237    11   8 1999       12:25             1177-04620      RT   I     390.0
## 238    11  10 1999       12:45             1207-72628      RT   I     394.0
## 239    11  13 1999       11:30             1177-04623      RT   I     376.0
## 240    11  13 1999       12:05             1177-04624      RT   I     399.0
## 241    11  17 1999       13:11             1207-72629      RT   I     399.0
## 242     9   7 2000       13:25             1207-22630      RT   I     400.0
## 243     9   9 2000        9:29             1207-72631      RT   I     382.0
## 244     9  13 2000        9:35             1177-04626      RT   I     390.0
## 245     9  13 2000       11:35             1177-04628      RT   I     376.0
## 246     9  13 2000       12:10             1177-04629      RT   A     331.0
## 247     9  18 2000       12:05             1207-72632      RT   I     394.0
## 248     9  18 2000       13:39             1207-77633      RT   A     358.0
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## 249     9  18 2000       14:33            1177-04632      RT   I     380.0
## 250     9  21 2000       11:35            1207-72634      RT   I     397.0
## 251     9  25 2000       12:06            1207-72635      RT   I     392.0
## 252     9  26 2000       12:40            1177-04635      RT   I     412.0
## 253     9  27 2000       13:00            1207-72637      RT   I     391.0
## 254     9  29 2000       10:25            1207-72638      RT   I   F 410.0
## 255     9  29 2000       13:00            1177-04639      RT   I   F 410.0
## 256     9  29 2000       13:30            1207-74639      RT   A   F 425.0
## 257     9  30 2000       13:30            1177-04640      RT   I     368.0
## 258     9  30 2000       15:01            1207-74640      RT   I     392.0
## 259    10   1 2000       14:50            1207-72641      RT   I     418.0
## 260    10   4 2000       11:56            1207-72642      RT   A     408.0
## 261    10   6 2000       12:59            1207-72643      RT   A     393.0
## 262    10   7 2000        9:55            1177-04643      RT   I     365.0
## 263    10   7 2000       10:27            1207-72644      RT   I     405.0
## 264    10   7 2000       10:43            1207-72645      RT   I     381.0
## 265    10   7 2000       12:24            1177-04644      RT   I     390.0
## 266    10   7 2000       15:12            1207-72646      RT   I     384.0
## 267    10   8 2000       12:25            1177-04645      RT   I     390.0
## 268    10  12 2000       13:35            1207-72647      RT   I     400.0
## 269    10  13 2000        9:58            1207-72648      RT   I     387.0
## 270    10  13 2000       11:08            1207-72649      RT   I     409.0
## 271    10  14 2000       13:12            1177-04651      RT   I     400.0
## 272    10  18 2000       14:28            1177-04653      RT   I     403.0
## 273    10  20 2000       14:12            1177-04657      RT   A     373.0
## 274    10  20 2000       14:45            1207-72650      RT   I     394.0
## 275    10  21 2000       14:12            1177-04658      RT   I     377.0
## 276    10  25 2000       12:51            1177-04659      RT   I     364.0
## 277    10  25 2000       13:45            1177-04660      RT   I     385.0
## 278    10  26 2000        9:21            1177-04661      RT   I     390.0
## 279    10  26 2000       10:53            1177-04662      RT   A     383.0
## 280    10  26 2000       12:53            1177-04663      RT   I     365.0
## 281    10  27 2000       14:49            1207-72651      RT   A     402.0
## 282    10  29 2000        9:45            1177-04665      RT   I     394.0
## 283    10  30 2000       11:20            1177-04666      RT   A     378.0
## 284    11   1 2000       13:16            1177-04668      RT   A     378.0
## 285    11   2 2000        9:55            1177-04669      RT   A     262.0
## 286    11   2 2000       12:47            1177-04670      RT   A     379.0
## 287    11   3 2000        9:42            1177-04671      RT   I     380.0
## 288    11   4 2000       11:20            1177-04672      RT   A     380.0
## 289    11   4 2000       13:10            1177-04673      RT   I     393.0
## 290    11   4 2000       13:24            1207-72652      RT   A     389.0
## 291    11   8 2000       10:31            1207-72653      RT   I     395.0
## 292    11  18 2000       10:47            1177-04675      RT   I     377.0
## 293    11  21 2000       12:03            1177-04677      RT   A     385.0
## 294     9   3 2001       13:30            1177-04698      RT   I     363.0
## 295     9  12 2001       11:35            1207-72654      RT   I     405.0
## 296     9  16 2001       14:00            1177-04679      RT   I     392.0
## 297     9  19 2001       11:55            1207-72655      RT   I     395.0
## 298     9  20 2001       12:50            1207-72656      RT   I     390.0
## 299     9  30 2001       12:33            1207-72657      RT   A     389.0
## 300    10   9 2001       14:58            1207-72658      RT   A     385.0
## 301    10  14 2001       10:27            1177-04682      RT   I     378.0
## 302    10  14 2001       11:52            1177-04683      RT   I     373.0
```

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## 303    10  14 2001       12:20            1177-04684      RT   A     419.0
## 304    10  14 2001       14:12            1177-04685      RT   I     414.0
## 305    10  17 2001       12:59            1177-04686      RT   I     404.0
## 306    10  18 2001       10:35            1207-72659      RT   I     379.0
## 307    10  18 2001       12:00           1207-72660       RT   I     407.0
## 308    10  18 2001       12:42            1177-04689      RT   I     376.0
## 309    10  18 2001       13:56            1177-04688      RT   I     380.0
## 310    10  18 2001       15:30            1207-72661      RT   I     408.0
## 311    10  19 2001       12:42            1177-04690      RT   A     374.0
## 312    10  25 2001       11:50            1177-04692      RT   I     372.0
## 313    10  28 2001       10:46            1177-04695      RT   A     389.0
## 314    10  28 2001       11:37            1207-72662      RT   A     404.0
## 315    11   6 2001       13:05            1177-04696      RT   A     395.0
## 316    11   7 2001       11:15            1177-04697      RT   I     368.0
## 317    11  10 2001       10:27            1177-04701      RT   A     377.0
## 318    11  19 2001        9:48            1177-04702      RT   A     277.0
## 319    11  19 2001       14:05            1207-72663      RT   A     435.0
## 320     9  10 2002       12:39            1177-04706      RT   I     393.0
## 321     9  12 2002       10:13            1207-72664      RT   I     402.0
## 322     9  21 2002       13:38            1207-72665      RT   I     362.0
## 323     9  22 2002       11:57            1177-04709      RT   I     388.0
## 324     9  22 2002       13:47            1177-04710      RT   I     392.0
## 325     9  22 2002       14:29            1207-72666      RT   I     412.0
## 326     9  23 2002       13:15            1177-04711      RT   I     371.0
## 327     9  25 2002       12:36            1177-04712      RT   I     385.0
## 328     9  29 2002       12:52            1207-72667      RT   I     400.0
## 329     9  30 2002       11:45            1207-72668      RT   I     395.0
## 330     9  30 2002       12:46            1207-72669      RT   I     403.0
## 331    10   5 2002       13:30            1177-04715      RT   I     361.0
## 332    10   6 2002       10:43            1177-04716      RT   I     377.0
## 333    10   6 2002       12:34            1177-04717      RT   I     375.0
## 334    10   7 2002       13:29            1207-72670      RT   I     401.0
## 335    10  10 2002       11:36            1177-04718      RT   I     407.0
## 336    10  13 2002       10:42            1177-04719      RT   I     375.0
## 337    10  13 2002       11:33            1177-04720      RT   A     406.0
## 338    10  14 2002        9:50            1177-04721      RT   I     386.0
## 339    10  14 2002       12:59            1177-04722      RT   I     378.0
## 340    10  17 2002        9:46            1177-04723      RT   I     379.0
## 341    10  18 2002       10:00            1177-04724      RT   I     364.0
## 342    10  18 2002       12:50            1177-04725      RT   A     350.0
## 343    10  18 2002       13:10             1207-7267      RT   I     380.0
## 344    10  19 2002       10:34            1207-72672      RT   A     395.0
## 345    10  19 2002       11:22            1177-04726      RT   I     372.0
## 346    10  20 2002       13:24            1177-04728      RT   I     367.0
## 347    10  23 2002       12:56            1177-04729      RT   I     386.0
## 348    10  26 2002       12:45            1177-04730      RT   I     375.0
## 349    10  30 2002       12:40            1177-04731      RT   A     405.0
## 350    10  31 2002       10:18            1177-04732      RT   A     371.0
## 351    11   1 2002       10:50            1177-04734      RT   A     368.0
## 352    11   2 2002       10:48            1177-04735      RT   I     372.0
## 353    11   2 2002       11:00            1177-04736      RT   I     396.0
## 354    11   2 2002       11:18            1177-04737      RT   I     365.0
## 355    11   3 2002       11:36            1177-04738      RT   I     374.0
## 356    11   6 2002       14:06            1177-04740      RT   I     376.0
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## 357    11   7 2002       11:58              1177-04741      RT   I     369.0
## 358    11   7 2002       12:28              1207-72673      RT   A     391.0
## 359    11   8 2002       11:45               1177-0472      RT   A     397.0
## 360    11   8 2002       14:29               1177-0473      RT   I     366.0
## 361    11  10 2002       11:35              1207-72674      RT   A     385.0
## 362    11  10 2002       12:35               1177-0744      RT   I     400.0
## 363     9  16 2003       12:55              1207-72675      RT   I     384.0
## 364     9  20 2003       12:04              1207-99560      RT   A     396.0
## 365     9  20 2003       13:35              1177-04746      RT   I     391.0
## 366     9  23 2003       10:44              1207-72676      RT   I     393.0
## 367     9  23 2003       11:16              1207-72677      RT   I     397.0
## 368     9  25 2003       13:08              1177-04747      RT   I     384.0
## 369     9  29 2003       12:02              1207-72678      RT   I     396.0
## 370     9  29 2003       15:55              1207-72679      RT   I     428.0
## 371    10   1 2003       11:53              1177-04751      RT   A     364.0
## 372    10   1 2003       14:30              1207-72680      RT   I     400.0
## 373    10   3 2003       14:43              1207-72681      RT   I     398.0
## 374    10   4 2003       11:04              1177-04754      RT   I     385.0
## 375    10   7 2003       11:42              1177-04756      RT   A     372.0
## 376    10   7 2003       11:58              1207-72682      RT   I     400.0
## 377    10   8 2003       11:08              1207-72683      RT   I     403.0
## 378    10   8 2003       12:28              1177-04757      RT   I     375.0
## 379    10  10 2003       11:43              1177-04759      RT   I     385.0
## 380    10  12 2003       12:10              1207-72684      RT   I     392.0
## 381    10  13 2003                          1207-72685      RT   I     415.0
## 382    10  14 2003       12:24              1177-04761      RT   A     380.0
## 383    10  18 2003       12:45               788-36611      RT   A     411.0
## 384    10  21 2003       11:35              1207-72686      RT   I     393.0
## 385    10  21 2003       13:02              1177-04762      RT   I     370.0
## 386    10  25 2003       11:53              1177-04764      RT   I     371.0
## 387    10  25 2003       12:47              1207-72687      RT   I     400.0
## 388    10  25 2003       12:55              1177-04765      RT   A     382.0
## 389    10  25 2003       13:27              1807-53142      RT   A     371.0
## 390    10  25 2003       13:40              1177-04766      RT   A     370.0
## 391    10  30 2003       13:35              1177-04769      RT   A     392.0
## 392    11   7 2003       12:30              1177-04771      RT   A     387.0
## 393    11   7 2003       13:45              1177-04772      RT   I     400.0
## 394    11  13 2003       14:00              1177-04773      RT   A     370.0
## 395    11  17 2003       10:19              1177-04774      RT   A     360.0
## 396    11  18 2003       13:45              1177-04776      RT   A     402.0
## 397    11  18 2003       14:44              1177-04777      RT   I     380.0
## 398    11  20 2003       13:30              1207-53145      RT   A     199.0
##     Weight Culmen Hallux Tail StandardTail Tarsus WingPitFat KeelFat Crop
## 1     1090  28.50  32.20  230           NA     NA         NA      NA   NA
## 2     1210  29.30  31.30  210           NA     NA         NA      NA   NA
## 3     1120  26.00  30.20  238           NA     NA         NA      NA   NA
## 4     1010  26.30  30.80  222           NA     NA         NA      NA   NA
## 5     1010  25.40  29.70  217           NA     NA         NA      NA   NA
## 6     1120  28.90  30.90  213           NA     NA         NA      NA   NA
## 7     1170  26.50  34.00  243           NA     NA         NA      NA   NA
## 8     1390  30.50  34.00  232           NA     NA         NA      NA   NA
## 9     1150  27.10  31.00  238           NA     NA         NA      NA   NA
## 10    1010  24.00  26.90  227           NA     NA         NA      NA   NA
## 11    1070  26.40  31.20  222           NA     NA         NA      NA   NA
```

```
## 12    1190  28.80  31.60  237          NA     NA         NA      NA   NA
## 13    1330  27.00  30.30  213          NA     NA         NA      NA   NA
## 14    1100  26.20  32.50  190          NA     NA         NA      NA   NA
## 15    1190  28.60  31.60  245          NA     NA         NA      NA   NA
## 16    1490  30.10  32.40  246          NA     NA         NA      NA   NA
## 17    1040  27.10  31.40  207          NA     NA         NA      NA   NA
## 18    1030  26.00  29.70  200          NA     NA         NA      NA   NA
## 19    1300  25.50  32.40  215          NA     NA         NA      NA   NA
## 20    1500  26.50  31.30  219          NA     NA         NA      NA   NA
## 21    1080  25.30  27.20  198          NA     NA         NA      NA   NA
## 22    1320  27.30  30.10  207          NA     NA         NA      NA   NA
## 23    1490  25.40  31.30  204          NA     NA         NA      NA   NA
## 24    1500  29.10  30.80  205          NA     NA         NA      NA   NA
## 25    1060  26.10  31.20  230          NA     NA         NA      NA   NA
## 26    1140  25.10  29.40  227          NA     NA         NA      NA   NA
## 27    1030  27.60  30.30  208          NA     NA         NA      NA   NA
## 28    1000  25.10  28.30  231          NA     NA         NA      NA   NA
## 29    1050  28.70  29.80  222          NA     NA         NA      NA   NA
## 30    1040  26.20  31.20  225          NA     NA         NA      NA   NA
## 31    1110  26.50  30.90  225          NA     NA         NA      NA   NA
## 32    1300  27.90  31.55  233          NA     NA         NA      NA   NA
## 33    1120  26.40  28.30  233          NA     NA         NA      NA   NA
## 34    1270  27.80  31.60  245          NA     NA         NA      NA   NA
## 35    1255  29.70  31.40  229          NA     NA         NA      NA   NA
## 36    1320  28.60  36.40  235          NA     NA         NA      NA   NA
## 37    1320  30.00  33.40  221          NA     NA         NA      NA   NA
## 38    1180  20.20  26.65  210          NA     NA         NA      NA   NA
## 39    1250  26.60  32.50  225          NA     NA         NA      NA   NA
## 40    1300  27.30  32.70  235          NA     NA         NA      NA   NA
## 41    1080  30.20  29.10  209          NA     NA         NA      NA   NA
## 42    1130  26.40  29.40  212          NA     NA         NA      NA   NA
## 43    1160  26.80  31.00  209          NA     NA         NA      NA   NA
## 44    1345  29.50  34.30  250          NA     NA         NA      NA   NA
## 45    1385  32.60  30.60  235          NA     NA         NA      NA   NA
## 46    1210  25.50  28.60  222          NA     NA         NA      NA   NA
## 47    1455  28.00  31.50  236          NA     NA         NA      NA   NA
## 48    1180  25.00  28.90  210          NA     NA         NA      NA   NA
## 49    1500  27.10  33.20  239          NA     NA         NA      NA   NA
## 50    1025  27.10  31.50  228          NA     NA         NA      NA   NA
## 51    1360  28.60  33.50  233          NA     NA         NA      NA   NA
## 52    1255  27.70  32.60  236          NA     NA         NA      NA   NA
## 53    1065  25.90  30.00  216          NA     NA         NA      NA   NA
## 54    1125  19.60  31.40  233          NA     NA         NA      NA   NA
## 55    1340  28.70  32.00  248          NA     NA         NA      NA   NA
## 56    1050  26.60  32.20  221          NA     NA         NA      NA   NA
## 57    1210  27.50 308.00  227          NA     NA         NA      NA   NA
## 58    1000  25.50  29.80  219          NA     NA         NA      NA   NA
## 59    1390  28.10  31.30  225          NA     NA         NA      NA   NA
## 60    1275  29.00  33.70  238          NA     NA         NA      NA   NA
## 61    1180  30.10 341.40  235          NA     NA         NA      NA   NA
## 62    1210  29.30  33.80  222          NA     NA         NA      NA   NA
## 63    1085  27.70  29.90  238          NA     NA         NA      NA   NA
## 64    1240  29.10  34.70  245          NA     NA         NA      NA   NA
## 65    1010  25.80  31.70  210          NA     NA         NA      NA   NA
```

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## 66    1210  27.80  32.60  241          NA     NA         NA      NA   NA
## 67    1170  28.10  31.70  238          NA     NA         NA      NA   NA
## 68    1350  30.50  32.00  235          NA     NA         NA      NA   NA
## 69    1370  29.30  33.00  240          NA     NA         NA      NA   NA
## 70    1310  27.40  34.10  234          NA     NA         NA      NA   NA
## 71    1035  26.10  30.80  232          NA     NA         NA      NA   NA
## 72    1125  25.40  30.90  220          NA     NA         NA      NA   NA
## 73    1140  26.20  29.80  214          NA     NA         NA      NA   NA
## 74    1210  28.10  28.90  238          NA     NA         NA      NA   NA
## 75    1205  28.80  31.30  238          NA     NA         NA      NA   NA
## 76    1045  27.60  27.50  229          NA     NA         NA      NA   NA
## 77    1090  26.60  28.80  202          NA     NA         NA      NA   NA
## 78    1190  30.30  32.80  226          NA     NA         NA      NA   NA
## 79    1110  24.70  30.20  122          NA     NA         NA      NA   NA
## 80    1075  26.50  30.70  208          NA     NA         NA      NA   NA
## 81    1070  25.60  30.40  204          NA     NA         NA      NA   NA
## 82    1120  29.40  31.60  229          NA     NA         NA      NA   NA
## 83    1060  27.60  29.00  205          NA     NA         NA      NA   NA
## 84    1125  27.20  27.40  244          NA     NA         NA      NA   NA
## 85    1100  27.00  28.20  225          NA     NA         NA      NA   NA
## 86    1360  30.00  33.90  239          NA     NA         NA      NA   NA
## 87    1095  21.10  31.40  209          NA     NA         NA      NA   NA
## 88    1075  25.50  29.70  211          NA     NA         NA      NA   NA
## 89    1140  26.80  29.20  216          NA     NA         NA      NA   NA
## 90    1240  27.90  31.80  250          NA     NA         NA      NA   NA
## 91    1465  29.70  34.60  260          NA     NA         NA      NA   NA
## 92    1105  26.70  28.90  217          NA     NA         NA      NA   NA
## 93    1010  27.10  31.40  228          NA     NA         NA      NA   NA
## 94    1075  26.30  30.50  218          NA     NA         NA      NA   NA
## 95    1060  27.90  30.90  220          NA     NA         NA      NA   NA
## 96    1015  27.60  31.10  227          NA     NA         NA      NA   NA
## 97    1100  26.00  30.20  211          NA     NA         NA      NA   NA
## 98    1010  25.00  30.60  222          NA     NA         NA      NA   NA
## 99    1000  26.30  30.10  225          NA     NA         NA      NA   NA
## 100   1240  28.70  32.40  231          NA     NA         NA      NA   NA
## 101   1360  27.90  33.10  235          NA     NA         NA      NA   NA
## 102   1405  29.10  82.80  235          NA     NA         NA      NA   NA
## 103   1055  27.00  29.10  200          NA     NA         NA      NA   NA
## 104   1670  27.10  32.90  216          NA     NA         NA      NA   NA
## 105   1250  26.20  30.50  223          NA     NA         NA      NA   NA
## 106   1030  25.30  29.90  210          NA     NA         NA      NA   NA
## 107   1040     NA  29.90  229          NA     NA         NA      NA   NA
## 108   1090  26.20  28.80  226          NA     NA         NA      NA   NA
## 109   1050  28.40  29.40  207          NA     NA         NA      NA   NA
## 110   1110  26.10  30.00  238          NA     NA         NA      NA   NA
## 111   1010  24.90  30.10  197          NA     NA         NA      NA   NA
## 112   1060  24.30  29.80  215          NA     NA         NA      NA   NA
## 113   1195  26.20  29.80  230          NA     NA         NA      NA   NA
## 114   1110  22.20  31.50  224          NA     NA         NA      NA   NA
## 115   1100  29.00  32.60  215          NA     NA         NA      NA   NA
## 116   1285  29.50  31.80  239          NA     NA         NA      NA   NA
## 117   1025  25.40  30.80  232          NA     NA         NA      NA   NA
## 118   1240  28.50  30.80  243          NA     NA         NA      NA   NA
## 119   1160  27.80  33.00  255          NA     NA         NA      NA   NA
```

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## 120   1240  26.80  32.70  276          NA     NA         NA      NA   NA
## 121   1240  25.60  31.20  231          NA     NA         NA      NA   NA
## 122   1030  25.20  29.80  216          NA     NA         NA      NA   NA
## 123   1250  26.50  32.00  210          NA     NA         NA      NA   NA
## 124   1120  26.50  30.80  260          NA     NA         NA      NA   NA
## 125   1000  26.40  30.10  200          NA     NA         NA      NA   NA
## 126   1040  27.70  32.10  230          NA     NA         NA      NA   NA
## 127   1150  27.80  31.10  220          NA     NA         NA      NA   NA
## 128   1000  25.90  30.20  220          NA     NA         NA      NA   NA
## 129   1360  33.30  28.60  235          NA     NA         NA      NA   NA
## 130   1260  27.70  31.80  221          NA     NA         NA      NA   NA
## 131   1300  25.90  31.90  238          NA     NA         NA      NA   NA
## 132   1040  26.40  30.90  212          NA     NA         NA      NA   NA
## 133   1320  29.40  33.90  235          NA     NA         NA      NA   NA
## 134   1280  27.90  32.70  229          NA     NA         NA      NA   NA
## 135   1310  26.10  31.10  251          NA     NA         NA      NA   NA
## 136   1220  28.60  30.40  225          NA     NA         NA      NA   NA
## 137   1135  26.40  32.40  267          NA     NA         NA      NA   NA
## 138   1280  28.00  32.40  248          NA     NA         NA      NA   NA
## 139   1220  27.30  33.00  241          NA     NA         NA      NA   NA
## 140   1000  26.70  28.00  212          NA     NA         NA      NA   NA
## 141   1120  26.80  50.20  221          NA     NA         NA      NA   NA
## 142   1280  27.50  31.80  230          NA     NA         NA      NA   NA
## 143   1350  28.30  32.60  226          NA     NA         NA      NA   NA
## 144   1020  26.50  31.10  217          NA     NA         NA      NA   NA
## 145   1000  27.10  30.60  230          NA     NA         NA      NA   NA
## 146   1020  26.50  29.40  225          NA     NA         NA      NA   NA
## 147   1340  26.85  31.90  226          NA     NA         NA      NA   NA
## 148   1300  27.30  30.50  214          NA     NA         NA      NA   NA
## 149   1015  25.50  30.10  242          NA     NA         NA      NA   NA
## 150   1000  26.10  29.60  250          NA     NA         NA      NA   NA
## 151   1050  24.80  32.50  220          NA     NA         NA      NA   NA
## 152   1175  28.30  33.20  230          NA     NA         NA      NA   NA
## 153   1260  29.00  32.80  234          NA     NA         NA      NA   NA
## 154   1050  25.90  31.30  226          NA     NA         NA      NA   NA
## 155   1330  29.20  32.20  218          NA     NA         NA      NA   NA
## 156   1540  29.90  35.50  235          NA     NA         NA      NA   NA
## 157   1060  25.50  26.90  223          NA     NA         NA      NA   NA
## 158   1420  29.90  32.00  245          NA     NA         NA      NA   NA
## 159   1142  27.20  33.00  235         244   89.3          0     1.0 0.00
## 160   1024  26.60  30.30  216         225   90.2          0     0.0 0.00
## 161   1023  25.80  30.10  216         228   82.8          1     0.0 0.25
## 162   1244     NA     NA  220          NA     NA         NA      NA   NA
## 163   1244  26.70  30.20  220         228   85.4          1     1.0 0.00
## 164   1289  28.60  32.10  242         261   86.9          0     0.0 0.00
## 165   1004  27.00  31.40  221         240   86.8          0     1.0 0.00
## 166   1097  28.90  33.40  236         244   91.3          0     1.0 0.00
## 167   1092  27.20  31.80  235         239   85.2          0     1.0 0.00
## 168   1049  30.10  32.00  231         240   84.9          0     0.0 0.00
## 169   1091  31.80  34.20  238         249   91.7          0     0.0 0.00
## 170   1151  34.10  33.70  249         250   94.0          1     1.0 0.25
## 171   1159  32.90  34.00  240         252   91.2          1     1.0 0.00
## 172   1239  26.70  33.20  231         243   90.3          0     2.0 0.00
## 173   1216  28.50  32.10  227         239   84.4          0     2.0 0.00
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## 174   1039  26.90  29.50  223          245   87.4          1     2.0 0.00
## 175   1079  25.20  30.00  228          239   86.2          0     0.0 0.00
## 176   1159  33.80  32.70  242          252   91.0          1     0.0 0.00
## 177   1403  34.90  34.70  247          259   92.5          0     1.0 1.00
## 178   1473  39.20  44.70  267          272     NA          2     2.0 0.50
## 179   1001  29.90  43.20  257          269     NA          1     0.0 0.00
## 180   1059  25.50  30.50  214          227   92.5         NA     1.0 0.50
## 181   1147  29.00  35.00  229          236   91.9         NA      NA   NA
## 182   1064  26.00  32.10  201          210   85.2          1     1.0 0.50
## 183   1213  24.90  28.00  244          218   87.9          1     2.0 0.00
## 184   1200  28.20  30.80  230          240   81.7          2     1.0 0.00
## 185   1040  25.30  29.40  227          234   80.8          1     0.0 0.00
## 186   1487  26.00  32.50  240           NA     NA         NA      NA   NA
## 187   1254  25.20  30.00  237           NA     NA         NA      NA   NA
## 188   1189  27.70  31.30  210           NA     NA         NA      NA   NA
## 189   1339  27.30  33.40  246           NA     NA         NA      NA   NA
## 190   1199  28.80  31.00  225           NA     NA         NA      NA   NA
## 191   1344  27.90  33.10  230           NA     NA         NA      NA   NA
## 192   1039  26.00  29.70  230           NA     NA         NA      NA   NA
## 193   1054  28.50  31.50  233           NA     NA         NA      NA   NA
## 194   1449  30.30  33.00  232           NA     NA         NA      NA   NA
## 195   1598  34.20  35.40  239           NA     NA         NA      NA   NA
## 196   1354  28.20  32.00  213           NA     NA         NA      NA   NA
## 197   1080  25.30  31.00  214           NA     NA         NA      NA   NA
## 198   1097  27.90  32.80  217           NA     NA         NA      NA   NA
## 199   1439  28.80  31.40  216           NA     NA         NA      NA   NA
## 200   1019  25.80  29.50  216           NA     NA         NA      NA   NA
## 201   1239  29.50  31.80  222           NA     NA         NA      NA   NA
## 202   1399  27.60  31.30  288           NA     NA         NA      NA   NA
## 203   1169  27.50  25.20  238           NA     NA         NA      NA   NA
## 204   1164  27.00  29.90  199           NA     NA         NA      NA   NA
## 205   1215  28.30  33.00  236          240     NA         NA     2.0 1.00
## 206   1030  27.60  31.40  225          227     NA         NA     2.0 0.00
## 207   1165  28.20  32.40  241          241     NA         NA     1.0 1.00
## 208   1044  23.50  29.00  210          222     NA         NA     1.0 1.00
## 209   1080     NA  32.30  223          216     NA         NA      NA   NA
## 210   1105  26.40  33.60  229          225     NA         NA      NA   NA
## 211   1310  28.30  35.20  211          217     NA         NA     2.0 0.00
## 212   1060  26.80  31.00  204          206     NA         NA     3.0 1.00
## 213   1270  29.40  33.00  236          231     NA         NA     1.0 1.00
## 214   1170  28.30  29.90  247          236     NA         NA     0.0 3.00
## 215   1225  29.00  31.50  227          219     NA         NA     3.0 0.00
## 216   1060  26.60  31.90  225          220     NA         NA     2.0 0.00
## 217   1145  25.50  10.30  215          214     NA         NA     2.0 1.00
## 218   1090  26.10  28.20  226          225     NA         NA     2.0 0.50
## 219   1345  32.60  33.90  227          233     NA         NA     3.0 0.25
## 220   1050  26.60  29.00  236          232     NA         NA     1.0 1.00
## 221   1040  27.10  30.80  210          203     NA         NA     1.0 0.00
## 222   1105  28.90  33.20  242          236     NA         NA     1.0 0.00
## 223   1045  27.20  30.00  221          214     NA         NA     2.0 1.00
## 224   1015  25.70  30.30  219          216     NA         NA     2.0 0.00
## 225   1385  27.90  32.60  225          222     NA         NA     2.0 0.00
## 226   1165  26.00  31.50  221          212     NA         NA     2.0 0.25
## 227   1460  29.40  33.60  216          221     NA         NA     2.0 1.00
```

```
## 228   1585  30.60  39.80  130          251     NA          NA     3.0 0.00
## 229   1460  29.30  35.60  221          234     NA          NA     1.0 0.50
## 230   1315  30.00  32.50  220          245     NA          NA     1.0 0.00
## 231   1019  26.00  29.90  186          205     NA          NA     0.0 1.00
## 232   1215  29.70  31.30  217          223     NA          NA     2.0 0.00
## 233   1005  27.80  31.40  209          224     NA          NA     1.0 0.00
## 234   1350  27.90  29.90  215          217     NA          NA     2.0 0.00
## 235   1145  27.70  31.80  214          226     NA          NA     1.0 0.00
## 236   1010  25.40  29.00  207          214     NA          NA     0.0 0.50
## 237   1120  26.60  30.00  210          225     NA          NA     1.0 0.50
## 238   1210  29.40  31.70  207          227     NA          NA     2.0 0.00
## 239   1145  25.10  31.55  226          234     NA          NA     2.0 0.75
## 240   1150  27.20  29.55  232          243     NA          NA     2.0 0.00
## 241   1560  30.00  33.85  228          232     NA          NA     3.0 1.00
## 242   1089  27.30  33.10  228          238     NA          NA     1.0 0.50
## 243   1194  29.40  33.80  237          234     NA          NA     1.0 0.00
## 244   1015  28.00  30.10  230          220     NA          NA     2.0 0.00
## 245   1035  26.80  30.50  223          234     NA          NA     2.0 5.00
## 246   1055  27.00  30.40  210          223     NA          NA     2.0 1.00
## 247   1220  30.30  34.50  234          234     NA          NA     1.0 0.00
## 248   1025  27.40  29.00  204          201     NA          NA     1.0 1.00
## 249   1000  26.90  29.00  204          217     NA          NA     3.0 1.00
## 250   1210  28.30  34.00  224          219     NA          NA     2.0 0.50
## 251   1185  28.50  33.00  229          234     NA          NA     2.0 0.00
## 252   1150  27.80  33.20  230          240     NA          NA     1.0 0.25
## 253   1120  29.00  33.90  225          236     NA          NA     2.0 0.25
## 254   1120  28.50  33.60  229          237     NA          NA     2.0 0.50
## 255   1200  26.70  29.40  247          255     NA          NA     2.0 0.00
## 256   1120  29.40  33.30  222          227     NA          NA     2.0 0.00
## 257   1120  24.70  30.80  220          224     NA          NA     2.0 1.00
## 258   1220  27.30  34.10  234          237     NA          NA     1.0 0.00
## 259   1310  29.10  31.90  248          255     NA          NA     2.0 0.50
## 260   1225  28.80  32.70  225          225     NA          NA     2.0 0.00
## 261   1400  27.90  35.30  215          221     NA          NA     3.0 0.00
## 262   1025  24.60  30.10  225          224     NA          NA     1.0 0.00
## 263   1140  28.20  31.90  244          249     NA          NA     1.0 0.00
## 264   1080  26.10  31.60  232          233     NA          NA     0.0 0.00
## 265   1135  27.60  31.10  238          239     NA          NA     2.0 0.00
## 266   1430  29.80  35.00  231          235     NA          NA     1.0 0.25
## 267   1050  25.60  29.90  218          221     NA          NA     1.0 0.25
## 268   1225  27.30  34.20  222          233     NA          NA     2.0 0.00
## 269   1090  27.90  32.40  227          227     NA          NA     2.0 0.00
## 270   1350  30.00  32.70  235          245     NA          NA     2.0 0.00
## 271   1190  29.40  33.30  231          237     NA          NA     2.0 0.00
## 272   1310  29.10  33.30  237          241     NA          NA     2.0 0.00
## 273   1270  26.50  29.60  207          210     NA          NA     2.0 0.00
## 274   1290  28.80  30.70  225          232     NA          NA     2.0 0.00
## 275   1045  26.90  31.50  223          225     NA          NA     2.0 0.00
## 276   1090  27.10  30.30  218          223     NA          NA     2.0 1.00
## 277   1180  28.60  30.00  222          225     NA          NA     2.0 0.00
## 278   1195  27.60  34.70  235          237     NA          NA     2.0 0.00
## 279   1055  27.70  32.70  208          208     NA          NA     2.0 0.00
## 280   1025  26.10  30.30  216          223     NA          NA     2.0 0.00
## 281   1335  28.30  33.30  219          217     NA          NA     2.0 0.25
```

```
## 282   1085  29.40  32.70  235          230     NA          NA     1.0 0.25
## 283   1090  28.00  30.90  212          217     NA          NA     2.0 0.25
## 284   1090  28.00  30.70  201          209     NA          NA     1.0 0.50
## 285   1020  28.00  31.20  200          207     NA          NA     2.0 0.00
## 286   1000  28.60  32.20  217          224     NA          NA     1.0 0.00
## 287   1085  27.40  33.30  223          225     NA          NA     1.0 0.00
## 288   1045  24.90  27.00  199          206     NA          NA     2.0 0.00
## 289   1060  27.70  32.40  217          225     NA          NA     1.0 0.00
## 290   1135  27.10  32.10  207          210     NA          NA     2.0 0.00
## 291   1210  28.50  28.50  222          223     NA          NA     3.0 0.00
## 292   1125  25.30  29.50  220          226     NA          NA     2.0 0.00
## 293   1195  27.30  30.90  216          227     NA          NA     3.0 0.00
## 294   1005  25.00  31.60  222          226     NA          NA     2.0 0.00
## 295   1170  29.25  39.80  226          230     NA          NA     2.0 0.00
## 296   1085  31.20  34.60  210          219     NA          NA     1.0 0.00
## 297   1115  27.40  32.70  235          240     NA          NA     1.0 0.00
## 298   1195  27.60  33.00  222          228     NA          NA     1.0 0.50
## 299   1165  29.00  33.10  223          226     NA          NA     2.0 0.00
## 300   1085  27.50  30.80  216          226     NA          NA     2.0 0.50
## 301   1030  28.50  31.90  218          223     NA          NA     2.0 0.00
## 302   1015  25.50  29.60  215          335     NA          NA     2.5 0.00
## 303   1030  29.20  31.50  224          229     NA          NA     2.5 0.00
## 304   1215  26.40  29.20  242          232     NA          NA     2.0 0.00
## 305   1170  28.40  32.80  237          240     NA          NA     1.0 0.00
## 306   1435  27.40  32.70  221          221     NA          NA     3.0 0.00
## 307   1235  30.10  35.80  243          246     NA          NA     2.0 0.00
## 308   1055  29.50  32.20  222          220     NA          NA     3.0 0.00
## 309   1105  22.00  30.80  208          212     NA          NA     2.0 0.50
## 310   1390  28.40  32.70  245          243     NA          NA     1.0 0.75
## 311   1080  26.50  31.30  206          214     NA          NA     3.0 0.00
## 312   2030  26.20  30.20  196          204     NA          NA     3.0 0.00
## 313   1265  26.60  30.60  210          217     NA          NA     3.0 0.25
## 314   1300  29.40  32.80  224          229     NA          NA     4.0 0.00
## 315   1170  25.80  30.50  218          225     NA          NA     3.0 0.25
## 316   1075  27.70  31.70  213          222     NA          NA     3.0 0.00
## 317   1095  25.60  31.70  206          210     NA          NA     3.0 0.00
## 318   1500  29.70  32.10  207          217     NA          NA     4.0 0.00
## 319   1595  27.40  34.50  230          233     NA          NA     3.0 0.25
## 320   1225  29.00  33.40  226          224     NA          NA     2.0 0.00
## 321   1255  30.60  34.60  242          243     NA          NA     3.0 0.25
## 322   1305  28.20  34.30  234          235     NA          NA     2.0 1.00
## 323   1185  28.90  34.30  225          226     NA          NA     3.0 0.00
## 324   1030  26.10  30.50  214          215     NA          NA     2.0 0.00
## 325   1215  28.70  34.10  230          237     NA          NA     2.0 0.00
## 326   1075  26.90  32.80  220          220     NA          NA     2.0 0.00
## 327   1225  27.80  32.00  225          228     NA          NA     3.0 0.00
## 328   1315  29.60  34.00  230          238     NA          NA     2.0 1.00
## 329   1155  29.90  34.40  233          230     NA          NA     2.0 0.00
## 330   1160  29.00  32.30  235          236     NA          NA     3.0 0.25
## 331   1030  27.00  30.50  231          233     NA          NA     2.0 0.00
## 332   1040  28.10  30.90  225          231     NA          NA     2.0 0.00
## 333   1005  26.00  32.50  226          234     NA          NA     2.0 0.00
## 334   1250  28.20  35.30  230          235     NA          NA     2.5 0.00
## 335   1275  27.50  33.70  238          245     NA          NA     2.0 0.00
```

```
## 336   1030  26.90  31.30  217          226     NA          NA     2.0 0.00
## 337   1290  29.30  33.30  227          226     NA          NA     2.0 0.00
## 338   1020  26.90  31.60  230          231     NA          NA     2.0 0.00
## 339   1055  26.50  29.90  217          226     NA          NA     3.0 0.00
## 340   1010  25.00  29.30  216          230     NA          NA     2.0 0.00
## 341   1015  24.90  29.50  215          219     NA          NA     2.0 0.50
## 342   1115  29.50  30.30  199          204     NA          NA     2.0 0.33
## 343   1320  26.70  31.60  210          216     NA          NA     3.0 0.00
## 344   1180  30.30  33.40  217          222     NA          NA     3.0 0.00
## 345   1145  25.90  32.20  212          225     NA          NA     3.5 0.40
## 346   1045  26.10  30.50  215          221     NA          NA     2.0 0.25
## 347   1065  26.10  31.00  221          229     NA          NA     2.0 0.25
## 348   1110  27.70  31.30  215          217     NA          NA     3.0 0.00
## 349   1255  27.90  31.80  218          225     NA          NA     3.0 0.00
## 350   1015  24.90  28.40  204          208     NA          NA     2.0 0.00
## 351   1090  27.30  30.40  216          220     NA          NA     2.0 0.00
## 352   1085  25.40  29.80  220          220     NA          NA     2.0 0.00
## 353   1065  27.70  30.00  230          235     NA          NA     3.0 0.00
## 354   1125  26.90  29.30  213          220     NA          NA     3.5 0.00
## 355   1050  25.50  30.30  220          225     NA          NA     2.0 0.00
## 356   1180  24.40  30.70  214          218     NA          NA     2.0 0.00
## 357   1095  26.60  28.40  215          220     NA          NA     2.0 0.00
## 358   1330  26.80  30.10  217          220     NA          NA     2.0 0.00
## 359   1100  22.10  28.80  219          215     NA          NA     2.0 0.00
## 360   1115  27.10  21.00  215          219     NA          NA     2.0 0.75
## 361   1400  30.30  33.30  211          220     NA          NA     3.0 0.00
## 362   1175  27.60  32.60  234          235     NA          NA     2.0 0.00
## 363   1260  28.60  32.50  226          226     NA          NA     2.5 0.00
## 364   1195  27.00  23.80  228          225     NA          NA     2.0 0.00
## 365   1035  27.90  33.10  221          226     NA          NA     2.0 0.00
## 366   1155  28.30  30.90  223          230     NA          NA     2.0 0.00
## 367   1260  27.80  32.90  232          231     NA          NA     3.0 0.00
## 368   1010  26.80  31.10  230          235     NA          NA     2.0 0.50
## 369   1240  28.90  32.80  237          245     NA          NA     3.0 0.00
## 370   1290  28.40  33.90  253          256     NA          NA     2.0 0.00
## 371   1150  26.10  28.20  196          202     NA          NA     2.0 0.00
## 372   1130  28.30  29.40  227          230     NA          NA     2.0 0.00
## 373   1205  27.60  33.40  227          235     NA          NA     2.0 0.00
## 374   1040  27.20  31.50  238          245     NA          NA     2.0 0.00
## 375   1010  24.30  29.00  197          203     NA          NA     1.0 0.00
## 376   1285  29.70  33.50  230          237     NA          NA     2.0 0.00
## 377   1350  28.00  32.80  140          245     NA          NA     2.0 0.00
## 378   1010  25.00  30.80  218          222     NA          NA     2.0 1.00
## 379   1370  26.40  29.20  233          235     NA          NA     3.0 0.00
## 380   1250  28.60  32.90  222          229     NA          NA     2.0 0.25
## 381   1285  29.40  34.00  242          242     NA          NA     2.0 0.25
## 382   1005  27.00  31.60  205          214     NA          NA     2.0 0.00
## 383   1220  28.10  32.70  236          245     NA          NA     2.0 0.00
## 384   1265  28.30  32.70  233          236     NA          NA     2.0 0.00
## 385   1020  24.60  30.00  211          215     NA          NA     2.0 0.00
## 386   1160  25.70  28.40  218          224     NA          NA     3.0 0.00
## 387   1585  29.00  33.80  241          248     NA          NA     4.0 0.25
## 388   1140  24.90  31.60  218          222     NA          NA     2.0 0.00
## 389   1115  25.30  29.20  208          214     NA          NA     3.0 0.25
```

```
## 390   1145  25.40  30.20  212          215     NA          NA     2.0 0.00
## 391   1030  26.30  28.10  196          201     NA          NA     2.0 0.50
## 392   1065  28.00  32.70  212          218     NA          NA     2.0 0.25
## 393   1050  26.10  29.70  237          246     NA          NA     3.0 0.25
## 394   1000  26.90  31.40  201          206     NA          NA     2.0 0.00
## 395   1325  26.20  30.60  224          230     NA          NA     4.0 0.75
## 396   1350  28.70  31.00  219          214     NA          NA     3.0 0.00
## 397   1525  26.00  27.60  224          227     NA          NA     3.0 0.00
## 398   1290  28.70  32.10  222          226     NA          NA     1.0 0.00
```

```
hSF <- select(Hawks, Wing, Weight, Tail )
head(hSF)
```

```
##   Wing Weight Tail
## 1  385    920  219
## 2  376    930  221
## 3  381    990  235
## 4  265    470  220
## 5  205    170  157
## 6  412   1090  230
```

```
head(select(filter(Hawks, Species == 'RT' & Weight >= 1000),Wing, Weight, Tail))
```

```
##   Wing Weight Tail
## 1  412   1090  230
## 2  412   1210  210
## 3  405   1120  238
## 4  393   1010  222
## 5  371   1010  217
## 6  390   1120  213
```

```
head(hSF <- Hawks %>%
  filter(Species == 'RT' & Weight >= 1000) %>%
  select(Wing, Weight, Tail ))
```

```
##   Wing Weight Tail
## 1  412   1090  230
## 2  412   1210  210
## 3  405   1120  238
## 4  393   1010  222
## 5  371   1010  217
## 6  390   1120  213
```

```
head(hSF)
```

```
##   Wing Weight Tail
## 1  412   1090  230
## 2  412   1210  210
## 3  405   1120  238
## 4  393   1010  222
## 5  371   1010  217
## 6  390   1120  213
```

Q2

```
num_variables <- ncol(hSF)
print(num_variables)
```

```
## [1] 3
```

```
print(nrow(hSF))
```

```
## [1] 398
```

#1.2 ##Q1

```
head(hSF %>% arrange(Wing))
```

```
##    Wing Weight Tail
## 1  37.2   1180  210
## 2 111.0   1340  226
## 3 199.0   1290  222
## 4 241.0   1320  235
## 5 262.0   1020  200
## 6 277.0   1500  207
```

#1.3, 1.4 ##Q1,Q2,Q3

```
code <- c("CH","RT","SS")
full <- c("Cooper's", "Red-tailed", "Sharp-shinned")
hawkSpeciesNameCodes <- data.frame(species_code = code, species_name_full = full)
print(hawkSpeciesNameCodes)
```

```
##   species_code species_name_full
## 1           CH          Cooper's
## 2           RT        Red-tailed
## 3           SS     Sharp-shinned
```

```
hawkSpeciesNameCodes %>% rename(Species = species_code)
```

```
##   Species species_name_full
## 1      CH          Cooper's
## 2      RT        Red-tailed
## 3      SS     Sharp-shinned
```

```
hawksFullName <- Hawks %>% rename(species_code = Species)
head(hawksFullName)
```

```
##   Month Day Year CaptureTime ReleaseTime  BandNumber species_code Age Sex Wing
## 1     9  19 1992       13:30               877-76317           RT   I      385
## 2     9  22 1992       10:30               877-76318           RT   I      376
## 3     9  23 1992       12:45               877-76319           RT   I      381
## 4     9  23 1992       10:50               745-49508           CH   I   F  265
## 5     9  27 1992       11:15              1253-98801           SS   I   F  205
## 6     9  28 1992       11:25             1207-55910            RT   I      412
##   Weight Culmen Hallux Tail StandardTail Tarsus WingPitFat KeelFat Crop
## 1    920   25.7   30.1  219           NA     NA         NA      NA   NA
## 2    930     NA     NA  221           NA     NA         NA      NA   NA
## 3    990   26.7   31.3  235           NA     NA         NA      NA   NA
## 4    470   18.7   23.5  220           NA     NA         NA      NA   NA
## 5    170   12.5   14.3  157           NA     NA         NA      NA   NA
## 6   1090   28.5   32.2  230           NA     NA         NA      NA   NA
```

```
hawksFullName_res <- select(left_join(hawksFullName, hawkSpeciesNameCodes), -species_code)
```

```
## Joining with `by = join_by(species_code)`
```

```
head(hawksFullName_res)
```

```
##   Month Day Year CaptureTime ReleaseTime  BandNumber Age Sex Wing Weight Culmen
## 1     9  19 1992       13:30               877-76317   I      385    920   25.7
## 2     9  22 1992       10:30               877-76318   I      376    930     NA
## 3     9  23 1992       12:45               877-76319   I      381    990   26.7
## 4     9  23 1992       10:50               745-49508   I   F  265    470   18.7
## 5     9  27 1992       11:15              1253-98801   I   F  205    170   12.5
## 6     9  28 1992       11:25             1207-55910    I      412   1090   28.5
##   Hallux Tail StandardTail Tarsus WingPitFat KeelFat Crop species_name_full
## 1   30.1  219           NA     NA         NA      NA   NA        Red-tailed
## 2     NA  221           NA     NA         NA      NA   NA        Red-tailed
## 3   31.3  235           NA     NA         NA      NA   NA        Red-tailed
## 4   23.5  220           NA     NA         NA      NA   NA          Cooper's
## 5   14.3  157           NA     NA         NA      NA   NA     Sharp-shinned
## 6   32.2  230           NA     NA         NA      NA   NA        Red-tailed
```

```
head(select(hawksFullName_res, Wing, Weight, Tail ),7)
```

```
##   Wing Weight Tail
## 1  385    920  219
## 2  376    930  221
## 3  381    990  235
## 4  265    470  220
## 5  205    170  157
## 6  412   1090  230
## 7  370    960  212
```

```
hawksWithBMI <- hawksFullName_res %>% rename(Species = species_name_full)
head(hawksFullName_res)
```

```
##   Month Day Year CaptureTime ReleaseTime  BandNumber Age Sex Wing Weight Culmen
## 1     9  19 1992       13:30               877-76317   I      385    920   25.7
## 2     9  22 1992       10:30               877-76318   I      376    930     NA
## 3     9  23 1992       12:45               877-76319   I      381    990   26.7
## 4     9  23 1992       10:50               745-49508   I   F  265    470   18.7
## 5     9  27 1992       11:15              1253-98801   I   F  205    170   12.5
## 6     9  28 1992       11:25             1207-55910    I      412   1090   28.5
##   Hallux Tail StandardTail Tarsus WingPitFat KeelFat Crop species_name_full
## 1   30.1  219           NA     NA         NA      NA   NA        Red-tailed
## 2     NA  221           NA     NA         NA      NA   NA        Red-tailed
## 3   31.3  235           NA     NA         NA      NA   NA        Red-tailed
## 4   23.5  220           NA     NA         NA      NA   NA          Cooper's
## 5   14.3  157           NA     NA         NA      NA   NA     Sharp-shinned
## 6   32.2  230           NA     NA         NA      NA   NA        Red-tailed
```

```
head(hawksWithBMI %>%
    mutate( bird_BMI = 1000 * (Weight / (Wing^2))) %>%
    arrange(desc(bird_BMI)) %>%
    select(bird_BMI,  Species ))
```

```
##    bird_BMI    Species
## 1 852.69973 Red-tailed
## 2 108.75741 Red-tailed
## 3  32.57493 Red-tailed
## 4  22.72688 Red-tailed
```

```
## 5  22.40818   Cooper's
## 6  19.54932 Red-tailed
```

1.5

Q1,Q2,Q3

```
 hawksWithBMI %>%
  group_by(Species) %>%
   summarize(num_rows=n(), mn_wing=mean(Wing),nd_wing= median(Wing,, na.rm=TRUE),t_mn_wing=mean(Wing,0.
```

```
## # A tibble: 3 x 6
##   Species       num_rows mn_wing nd_wing t_mn_wing b_wt_ratio
##   <chr>            <int>   <dbl>   <dbl>     <dbl>      <dbl>
## 1 Cooper's            70      NA     240        NA       1.67
## 2 Red-tailed         577    383.     384       385.      3.16
## 3 Sharp-shinned      261    185.     191       184.      1.67
```

```
Num_NAs <- hawksWithBMI %>% group_by(Species) %>% select(Wing, Weight, Culmen, Hallux, Tail, StandardTa
```

```
## Adding missing grouping variables: `Species`
```

```
print(Num_NAs)
```

```
## # A tibble: 3 x 9
##   Species        Wing Weight Culmen Hallux  Tail StandardTail Tarsus  Crop
##   <chr>         <int>  <int>  <int>  <int> <int>        <int>  <int> <int>
## 1 Cooper's          1      0      0      0     0           19     62    21
## 2 Red-tailed        0      5      4      3     0          250    538   254
## 3 Sharp-shinned     0      5      3      3     0           68    233    68
```

2

```
library(tidyverse)

impute_by_median<-function(x){
  mu<-median(x,na.rm=1) # first compute the mean of x
  impute_f<-function(z){ # coordinate-wise imputation
    if(is.na(z)){
      return(mu) # if z is na replace with mean
    }else{
      return(z) # otherwise leave in place
    } }
return(map_dbl(x,impute_f)) # apply the map function to impute across vector
}
v<-c(1,2,NA,4)
impute_by_median(v)
```

```
## [1] 1 2 2 4
```

```
x <- seq(0, 10, by = 0.1)
y <- 5 * x + 1
df_xy <- data.frame(x = x, y = y)
head(df_xy)
```

```
##     x   y
```

```
## 1 0.0 1.0
## 2 0.1 1.5
## 3 0.2 2.0
## 4 0.3 2.5
## 5 0.4 3.0
## 6 0.5 3.5
```

```
df_xy %>%
mutate(z=map2_dbl(x,y,~.x+.y)) %>%
head(5)
```

```
##     x   y   z
## 1 0.0 1.0 1.0
## 2 0.1 1.5 1.6
## 3 0.2 2.0 2.2
## 4 0.3 2.5 2.8
## 5 0.4 3.0 3.4
```

```
sometimes_missing <- function(index, value) {
  if (index %% 5 == 0) {
    return(NA)
  } else {
    return(value)
  }
}

sometimes_missing(14,25)
```

```
## [1] 25
```

```
sometimes_missing(15,25)
```

```
## [1] NA
```

```
df_xy_missing <- df_xy %>%
  mutate(row_num = row_number()) %>%
  mutate(y = map2_dbl(row_num, y, sometimes_missing)) %>%
  select(-row_num)

print(head(df_xy_missing, 10))
```

```
##      x   y
## 1  0.0 1.0
## 2  0.1 1.5
## 3  0.2 2.0
## 4  0.3 2.5
## 5  0.4  NA
## 6  0.5 3.5
## 7  0.6 4.0
## 8  0.7 4.5
## 9  0.8 5.0
## 10 0.9  NA
```

```
df_xy_imputed <- df_xy_missing %>%
  mutate(y = impute_by_median(y))
head(df_xy_imputed)
```

```
##     x    y
```

```
## 1 0.0  1.0
## 2 0.1  1.5
## 3 0.2  2.0
## 4 0.3  2.5
## 5 0.4 26.0
## 6 0.5  3.5
```

2.2

```
#install.packages("readxl")
library(readxl) # load the readxl library
folder_path <- "./"
#folder_path<-"C:/Users/" # set this to the name of the
# directory containing "HockeyLeague.xlsx"
file_name<-"HockeyLeague.xlsx" # set the file name
file_path<-paste(folder_path,file_name,sep="") # create the file_path
wins_data_frame<-read_excel(file_path,sheet="Wins") # read of a sheet from an xl file
```

```
## New names:
## * `` -> `...1`
```

```
wins_data_frame %>%
select(1:5)%>%
head(3)
```

```
## # A tibble: 3 x 5
##   ...1   `1990`   `1991`   `1992`   `1993`
##   <chr>  <chr>    <chr>    <chr>    <chr>
## 1 Ducks  30 of 50 11 of 50 30 of 50 12 of 50
## 2 Eagles 24 of 50 12 of 50 37 of 50 14 of 50
## 3 Hawks  20 of 50 22 of 50 33 of 50 11 of 50
```

```
library(dplyr)
library(tidyr)
# Q1
wins_tidy <- wins_data_frame %>%
    pivot_longer(cols = -...1, names_to = "Year", values_to = "Wins") %>%
    separate(Wins, into = c("Wins", "Total"), sep = " of ") %>%
    mutate(
        Year = as.integer(Year),
        Wins = as.integer(Wins),
        Total = as.integer(Total)
    ) %>%
    rename(Team = ...1)


head(wins_tidy)
```

```
## # A tibble: 6 x 4
##   Team   Year  Wins Total
##   <chr> <int> <int> <int>
## 1 Ducks  1990    30    50
## 2 Ducks  1991    11    50
## 3 Ducks  1992    30    50
## 4 Ducks  1993    12    50
```

```
## 5 Ducks  1994    24    50
## 6 Ducks  1995    13    50
```

```
# Q2
losses_data <- read_excel("HockeyLeague.xlsx", sheet = "Losses")
```

```
## New names:
## * `` -> `...1`
```

```
losses_tidy <- losses_data %>%
    pivot_longer(cols = -...1, names_to = "Year", values_to = "Losses") %>%
    separate(Losses, into = c("Losses", "Total"), sep = " of ") %>%
    mutate(
        Year = as.integer(Year),
        Losses = as.integer(Losses),
        Total = as.integer(Total)
    )

losses_tidy <- losses_tidy %>%
    group_by(...1, Year) %>%
    mutate(Draws = Total - Losses) %>%
    ungroup()

losses_tidy <- losses_tidy %>%
    select(...1, Year, Losses, Total) %>%
    rename(Team = ...1)


head(losses_tidy, 5)
```

```
## # A tibble: 5 x 4
##   Team   Year Losses Total
##   <chr> <int>  <int> <int>
## 1 Ducks  1990     20    50
## 2 Ducks  1991     37    50
## 3 Ducks  1992      1    50
## 4 Ducks  1993     30    50
## 5 Ducks  1994      7    50
```

```
#Q3
# Combine wins_tidy and losses_tidy
hockey_df <- wins_tidy %>%
    left_join(losses_tidy, by = c("Team", "Year","Total")) %>%
    mutate(
        Wins = ifelse(!is.na(Wins), Wins, 0),
        Losses = ifelse(!is.na(Losses), Losses, 0),
        Draws = Total - Wins - Losses,  # Calculate Draws
        Wins_rt = Wins / Total,
        Losses_rt = Losses / Total,
        Draws_rt = Draws / Total
    ) %>%
    select(Team, Year, Wins, Total, Losses, Draws, Wins_rt, Losses_rt, Draws_rt)

# Print the top 5 rows
head(hockey_df, 5)
```

```
## # A tibble: 5 x 9
##   Team   Year  Wins Total Losses Draws Wins_rt Losses_rt Draws_rt
##   <chr> <int> <int> <int>  <int> <int>   <dbl>     <dbl>    <dbl>
## 1 Ducks  1990    30    50     20     0    0.6       0.4      0
## 2 Ducks  1991    11    50     37     2    0.22      0.74     0.04
## 3 Ducks  1992    30    50      1    19    0.6       0.02     0.38
## 4 Ducks  1993    12    50     30     8    0.24      0.6      0.16
## 5 Ducks  1994    24    50      7    19    0.48      0.14     0.38
```

```
#Q4
library(dplyr)

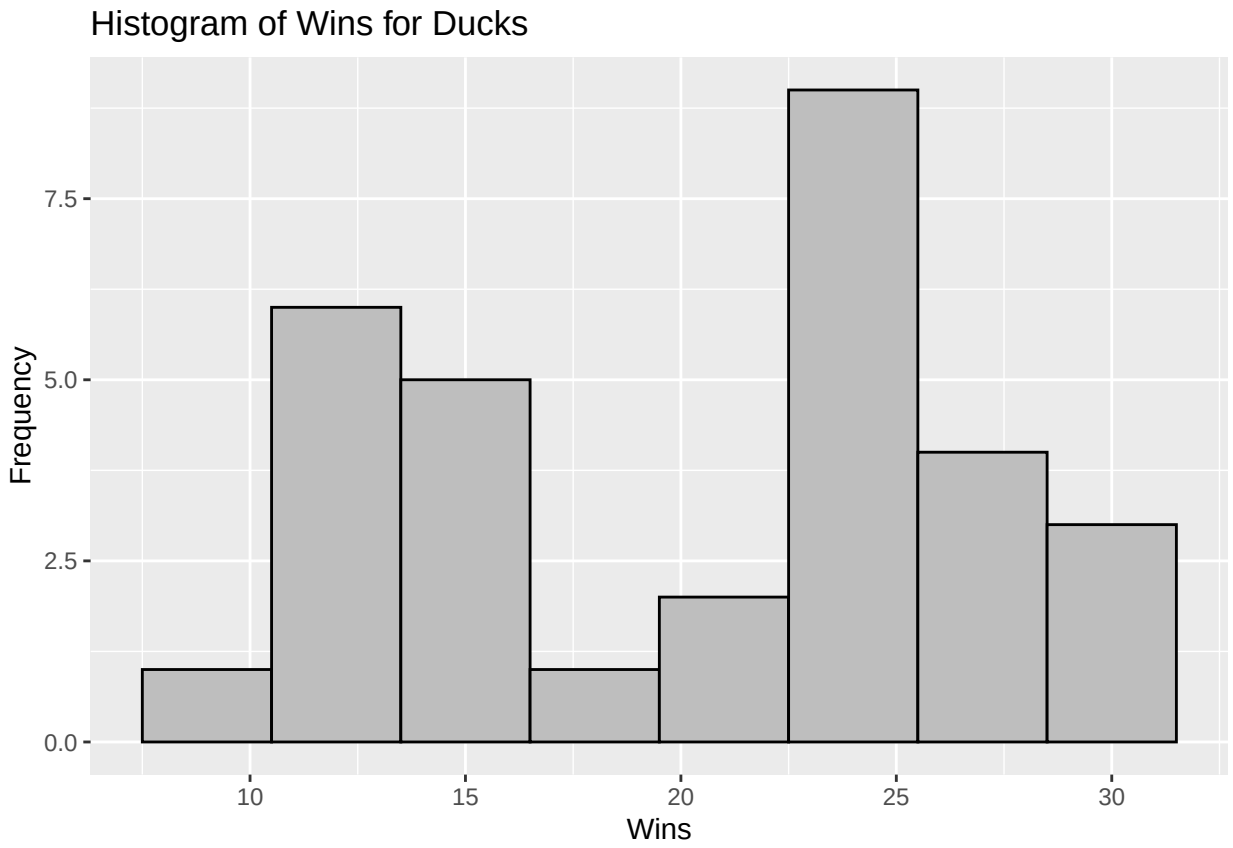
summary_df <- hockey_df %>%
  group_by(Team) %>%
  summarise(
    W_md = median(Wins_rt),
    W_mn = mean(Wins_rt),
    L_md = median(Losses_rt),
    L_mn = mean(Losses_rt),
    D_md = median(Draws_rt),
    D_mn = mean(Draws_rt)
  ) %>%
  arrange(desc(W_md))

summary_df
```

```
## # A tibble: 8 x 7
##   Team         W_md  W_mn  L_md  L_mn  D_md  D_mn
##   <chr>       <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 Eagles      0.45  0.437 0.25  0.279 0.317 0.284
## 2 Penguins    0.45  0.457 0.3   0.310 0.133 0.232
## 3 Hawks       0.417 0.388 0.233 0.246 0.32  0.366
## 4 Ducks       0.383 0.362 0.34  0.333 0.25  0.305
## 5 Owls        0.32  0.333 0.3   0.33  0.383 0.337
## 6 Ostriches   0.3   0.309 0.4   0.395 0.267 0.296
## 7 Storks      0.3   0.284 0.22  0.283 0.48  0.433
## 8 Kingfishers 0.233 0.245 0.34  0.360 0.4   0.395
```

3

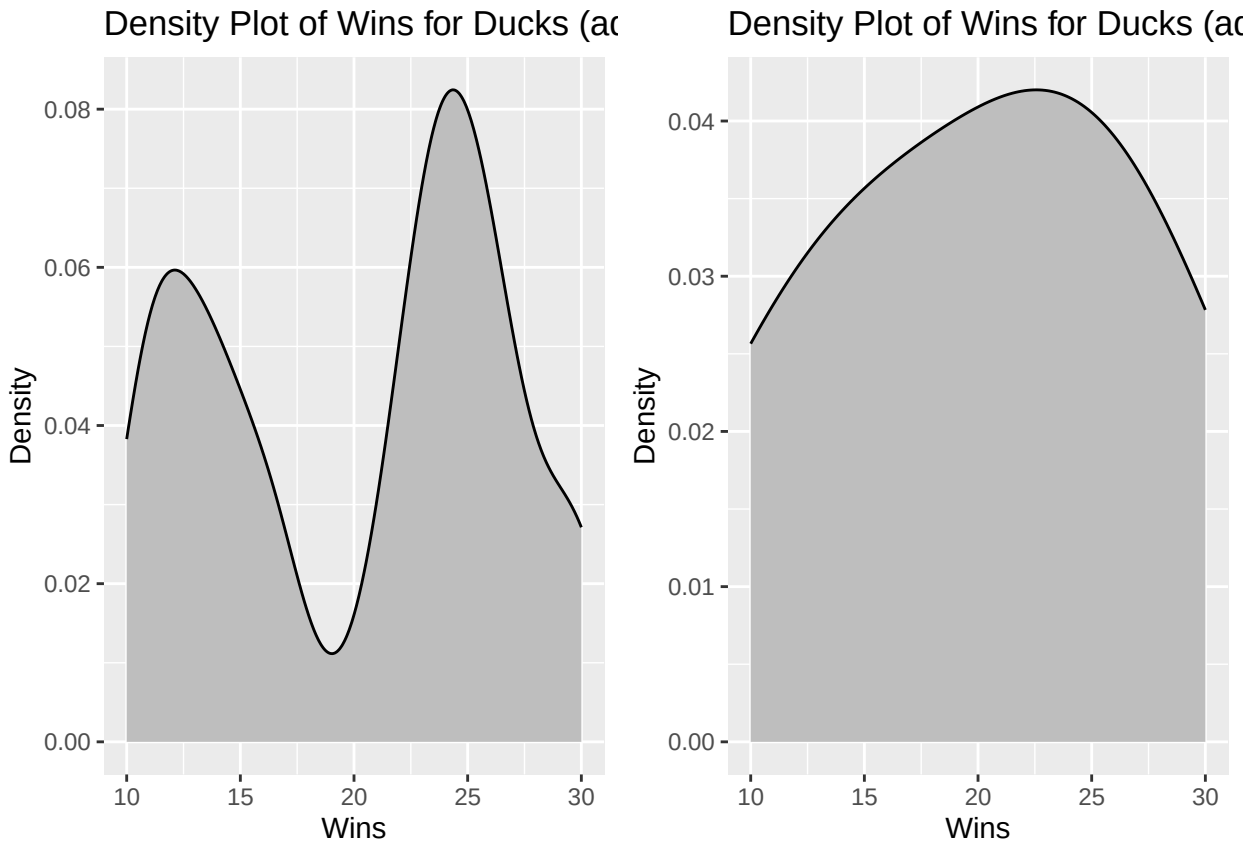
```
## Q1
library(ggplot2)
# Filter the data
ducks_data <- wins_tidy %>%
  filter(Team == "Ducks")
# Create a histogram plot
ggplot(ducks_data, aes(x = Wins)) +
  geom_histogram(binwidth = 3, fill = "grey", color = "black") +
  labs(
    title = "Histogram of Wins for Ducks",
    x = "Wins",
    y = "Frequency"
  )
```



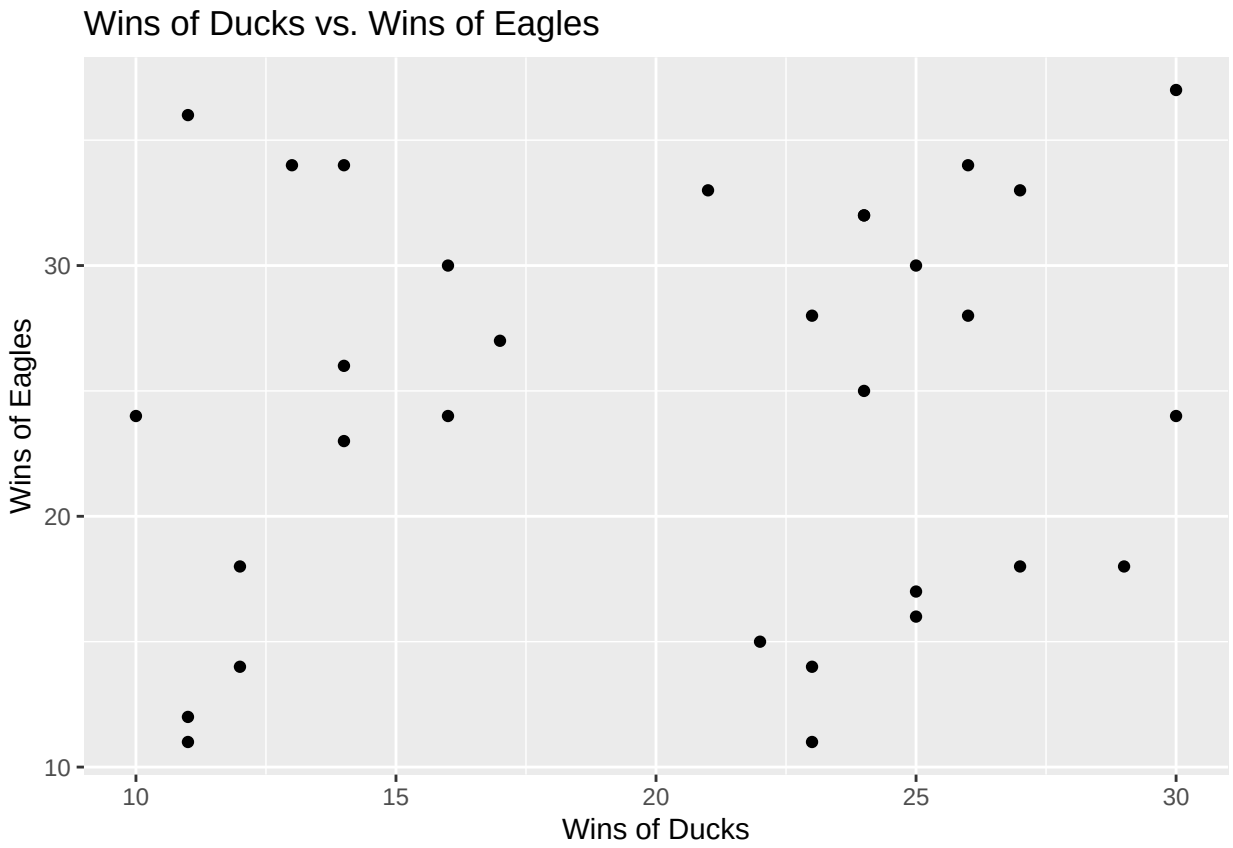

```r
## Q2
library(ggplot2)

# Filter the data for the team "Ducks"
ducks_data <- wins_tidy %>%
    filter(Team == "Ducks")

# Create a density plot with adjust=0.5
plot1 <- ggplot(ducks_data, aes(x = Wins)) +
    geom_density(fill = "grey", color = "black", adjust = 0.5) +
    labs(
        title = "Density Plot of Wins for Ducks (adjust=0.5)",
        x = "Wins",
        y = "Density"
    )

# Create a density plot with adjust=2
plot2 <- ggplot(ducks_data, aes(x = Wins)) +
    geom_density(fill = "grey", color = "black", adjust = 2) +
    labs(
        title = "Density Plot of Wins for Ducks (adjust=2)",
        x = "Wins",
        y = "Density"
    )

# Combine the two plots side by side
library(gridExtra)
```

```
##
## Attaching package: 'gridExtra'
## The following object is masked from 'package:dplyr':
##
##     combine
```

```r
grid.arrange(plot1, plot2, ncol = 2)
```




```r
## Q3
library(dplyr)
library(ggplot2)

# Create the "wins_teams" data frame
wins_teams <- wins_tidy %>%
  select(Year, Team, Wins) %>%
  pivot_wider(names_from = Team, values_from = Wins)

# Create the scatter plot
ggplot(wins_teams, aes(x = Ducks, y = Eagles)) +
  geom_point() +
  labs(
    title = "Wins of Ducks vs. Wins of Eagles",
    x = "Wins of Ducks",
    y = "Wins of Eagles"
  )
```


Wins of Ducks vs. Wins of Eagles
Wins of Eagles
30
20
10
10
15
20
25
30
Wins of Ducks