Class 10: Genome Informatics

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2/17/2022

Examine 1000 Genome Data

> Q5: What proportion of the Mexican Ancestry in Los Angeles sample population (MXL) are homozygous for the asthma associated SNP (G|G)?

14.06

```
# Read genotype file from Ensemble
mxl <- read.csv("373531-SampleGenotypes-Homo_sapiens_Variation_Sample_rs8067378.csv")
round(table(mxl$Genotype..forward.strand.)/nrow(mxl)*100,2)
```

```
##
##   A|A   A|G   G|A   G|G
## 34.38 32.81 18.75 14.06
```

What about a different population? Here we take the British in England and Scotland (GBR)

```
gbr <- read.csv("373522-SampleGenotypes-Homo_sapiens_Variation_Sample_rs8067378.csv")
round(table(gbr$Genotype..forward.strand.)/nrow(gbr) * 100,2)
```

```
##
##   A|A   A|G   G|A   G|G
## 25.27 18.68 26.37 29.67
```

Expression by Genotype analysis

I want read my RNA-Seq expression results into R. This file is not a CSV but rather has fields separated by space.

```
x <- read.table("rs8067378_ENSG00000172057.6.txt")
x
```

```
##      sample geno      exp
## 1   HG00367  A/G 28.96038
## 2   NA20768  A/G 20.24449
## 3   HG00361  A/A 31.32628
## 4   HG00135  A/A 34.11169
## 5   NA18870  G/G 18.25141
```

```
## 6   NA11993  A/A 32.89721
## 7   HG00256  A/G 31.48736
## 8   NA18498  A/A 47.64556
## 9   HG00327  G/G 17.67473
## 10  HG00115  A/G 33.85374
## 11  NA20806  A/G 16.29854
## 12  HG00278  A/G 19.73450
## 13  NA20585  A/A 30.71355
## 14  NA19137  A/G 13.96175
## 15  HG00235  A/A 25.44983
## 16  NA20798  A/A 34.24915
## 17  NA12546  G/G 18.55622
## 18  NA19116  A/A 35.15014
## 19  HG00381  A/G 18.40351
## 20  NA18488  G/G 23.10383
## 21  HG00259  A/G 34.21985
## 22  HG00177  A/G 23.32404
## 23  NA19214  G/G 30.94554
## 24  NA19247  A/A 24.54684
## 25  NA19098  A/G 23.18606
## 26  NA20589  A/G 18.15997
## 27  NA19207  A/A 49.39612
## 28  HG00112  G/G 21.14387
## 29  NA20518  G/G 18.39547
## 30  HG00335  A/A 28.20755
## 31  NA19119  G/G 12.02809
## 32  HG00247  G/G 17.44761
## 33  NA12155  A/G 28.03580
## 34  NA20771  A/G 30.65270
## 35  NA20758  G/G 29.82254
## 36  HG00121  A/G 20.51327
## 37  NA20759  A/A 28.56199
## 38  NA20816  A/G 29.72309
## 39  NA20542  A/G 22.50789
## 40  NA18511  A/G 31.68959
## 41  NA12249  G/G 23.01983
## 42  NA11830  A/G 28.76435
## 43  NA19159  A/G 35.85543
## 44  NA20778  A/G 37.62403
## 45  NA18908  A/G 20.54885
## 46  HG00320  G/G 13.42470
## 47  NA11843  G/G 22.65437
## 48  HG00105  A/A 51.51787
## 49  NA20588  G/G 11.07445
## 50  NA20510  G/G 28.35841
## 51  NA12342  A/G 31.04941
## 52  HG00249  A/G 18.94583
## 53  NA11894  A/A 38.10956
## 54  HG00240  A/G 32.29483
## 55  HG00132  A/A 31.13741
## 56  HG00118  G/G 28.79371
## 57  NA18520  G/G 27.08956
## 58  NA18508  A/G 27.81775
## 59  HG00353  A/G 19.89903
```

```
## 60  NA20792  A/G 48.03410
## 61  NA12234  G/G 16.11138
## 62  HG00377  A/A 39.12999
## 63  NA19143  A/G 27.90313
## 64  NA20787  A/G 36.47949
## 65  NA20513  A/G 20.03116
## 66  HG00243  A/G 29.65063
## 67  NA19172  A/A 32.44173
## 68  NA06994  A/G 34.92257
## 69  NA18510  A/G 16.71385
## 70  HG00337  A/G 16.68151
## 71  NA20503  A/G 25.71008
## 72  NA19152  G/G 26.61928
## 73  NA20761  G/G 30.18323
## 74  NA19235  A/G 11.60808
## 75  HG00382  A/G 19.30953
## 76  NA20544  A/A 34.03260
## 77  NA18923  G/G 19.40790
## 78  HG00313  A/G 20.49040
## 79  HG00238  G/G 19.52301
## 80  NA20754  A/G 22.37224
## 81  NA11918  A/G 15.20045
## 82  NA18868  A/A 36.27151
## 83  NA06986  A/G 20.07459
## 84  HG00263  A/G 35.42982
## 85  NA12058  G/G 26.56808
## 86  NA20507  A/G 19.10884
## 87  NA12777  A/G 24.81087
## 88  NA12144  A/G 33.22193
## 89  HG00129  G/G 17.34076
## 90  HG00123  A/G 33.40835
## 91  NA12814  A/G 22.38996
## 92  HG00183  G/G 10.74263
## 93  HG00109  G/G 16.66051
## 94  NA20505  A/G 31.31626
## 95  NA12273  A/G  9.36055
## 96  HG00174  A/A 26.10355
## 97  HG00324  A/A 19.48106
## 98  HG00365  A/G 23.17937
## 99  NA20520  A/A 38.77623
## 100 NA19189  A/G 30.63079
## 101 HG00155  A/G 19.10420
## 102 HG00111  A/A 40.82922
## 103 NA12827  A/G 25.70962
## 104 NA18517  G/G 29.01720
## 105 NA20801  G/G 20.69333
## 106 NA20529  G/G 21.15677
## 107 NA18909  A/G 38.34531
## 108 HG00173  A/G 19.03976
## 109 HG00349  G/G 18.58691
## 110 HG00234  G/G 19.04962
## 111 NA19248  G/G 22.81974
## 112 NA20810  A/A 46.50527
## 113 HG00255  A/G 28.81770
```

```
## 114 NA12813  G/G 32.01142
## 115 NA20537  G/G 21.12823
## 116 NA18912  A/G 42.75662
## 117 HG00332  G/G 18.61268
## 118 HG00152  G/G 19.37093
## 119 NA20783  G/G 31.42162
## 120 NA12154  A/G 25.61662
## 121 HG00236  A/A 33.07320
## 122 NA19146  A/A 25.47283
## 123 HG00312  A/G 26.48467
## 124 HG00148  A/G 28.02486
## 125 HG00364  A/G 24.23377
## 126 HG00311  A/G 21.03717
## 127 NA11881  A/A 29.50655
## 128 HG00185  G/G 16.67764
## 129 NA20807  A/G 33.51752
## 130 NA19184  A/G 20.73493
## 131 HG00133  A/G 33.55650
## 132 NA20531  G/G 19.08659
## 133 NA19138  A/A 27.48438
## 134 NA19206  A/G 36.62034
## 135 HG00277  G/G 21.55001
## 136 NA18858  A/G 40.06318
## 137 HG00375  A/G 33.92744
## 138 HG00127  A/G 21.02084
## 139 NA19099  A/G 29.95687
## 140 HG00336  G/G  8.29591
## 141 HG00097  A/G 25.80393
## 142 HG00267  A/G 21.49924
## 143 NA20581  G/G 12.58869
## 144 NA12286  A/G 34.79575
## 145 NA20797  A/G 34.57705
## 146 NA12872  A/G 30.03549
## 147 HG00360  A/G 16.59638
## 148 NA20530  A/G 27.22300
## 149 NA12348  A/G 24.35621
## 150 NA20538  G/G 17.34109
## 151 NA12760  A/G 22.86793
## 152 NA12763  A/G 23.19511
## 153 NA20814  G/G 28.23642
## 154 NA19222  A/A 35.69719
## 155 NA06989  A/A 32.42236
## 156 NA19171  G/G 19.99979
## 157 NA11829  A/G 33.74015
## 158 NA11992  A/G 24.08401
## 159 HG00141  G/G 25.55413
## 160 NA19150  A/G 26.39419
## 161 NA20828  A/G 32.33359
## 162 NA12749  A/A 28.91526
## 163 NA19190  G/G 24.45672
## 164 NA06985  A/G 11.36287
## 165 HG00178  A/G 21.16515
## 166 NA10851  G/G 23.53572
## 167 HG00371  A/A 19.14544
```

```
## 168 NA20541  A/G 17.21277
## 169 NA12004  A/A 22.85572
## 170 HG00116  G/G 22.48273
## 171 NA12272  G/G 14.66862
## 172 NA19096  G/G 33.95602
## 173 NA20800  A/G 22.73049
## 174 HG00102  A/A 31.17067
## 175 NA19236  G/G 18.26466
## 176 HG00264  A/G 25.57669
## 177 NA20521  A/A 27.87464
## 178 HG00345  G/G 16.06661
## 179 NA20509  A/A 27.91580
## 180 HG00329  A/A 16.86780
## 181 NA12830  A/G 11.97590
## 182 HG00359  A/A 23.66127
## 183 NA07051  A/G 25.35846
## 184 NA20516  A/G 33.32411
## 185 HG00128  A/G 22.09122
## 186 NA20534  A/G 25.19977
## 187 NA11892  A/A 28.03403
## 188 NA20804  A/A 36.51922
## 189 NA11994  A/G 30.83577
## 190 HG00156  G/G 17.32504
## 191 NA12843  A/G 23.63709
## 192 HG00180  A/G 19.66773
## 193 HG00282  G/G 19.14766
## 194 HG00343  G/G 12.57599
## 195 HG00139  G/G 22.28749
## 196 HG01789  A/G 24.64870
## 197 HG00321  A/G 17.03159
## 198 HG00306  A/A 27.43637
## 199 HG00232  G/G 17.29261
## 200 NA20528  A/G 22.27101
## 201 HG00122  G/G 24.18141
## 202 NA07037  A/A 35.63983
## 203 NA07056  A/G 15.92557
## 204 HG00151  A/G 32.54150
## 205 NA19129  A/A 38.85161
## 206 NA20517  A/G 22.40203
## 207 NA19149  G/G 16.07627
## 208 HG00341  A/G 27.41638
## 209 HG00274  A/G 31.99645
## 210 HG00106  A/G 30.05415
## 211 HG00189  G/G 14.80495
## 212 HG00252  A/G 20.01602
## 213 NA11832  A/G 34.47373
## 214 HG00323  A/A 22.44576
## 215 NA18916  A/A 37.06379
## 216 NA18867  A/G 28.75978
## 217 HG00100  A/A 35.67637
## 218 HG00126  G/G 23.46573
## 219 NA20813  A/G 29.91249
## 220 NA20504  A/G 15.71646
## 221 NA20532  A/G 21.76610
```

```
## 222 NA12812  A/G  9.62656
## 223 HG00244  A/G 28.53965
## 224 HG00265  G/G 28.97074
## 225 HG00378  G/G 27.78837
## 226 NA20790  A/A 50.16704
## 227 NA20512  A/A 37.94544
## 228 HG00268  A/A 29.15536
## 229 HG00380  A/A 28.85309
## 230 NA12761  A/A 38.57101
## 231 HG00384  A/G 29.49417
## 232 NA20796  G/G 23.92355
## 233 NA12399  G/G  9.55902
## 234 HG00310  A/G 29.55520
## 235 HG00096  A/A 30.89365
## 236 NA19147  A/G 19.44178
## 237 NA20752  A/G 21.43751
## 238 NA19107  A/G 30.40382
## 239 HG00099  G/G 12.35836
## 240 NA07048  A/A 39.31537
## 241 NA19114  G/G 22.53910
## 242 HG00376  A/A 31.43743
## 243 NA19092  A/A 35.26739
## 244 HG00130  A/G 28.50982
## 245 HG00158  A/A 22.37043
## 246 HG00269  A/A 28.46943
## 247 NA19210  G/G 21.98118
## 248 HG00258  A/A 30.15636
## 249 NA19256  A/G 21.48847
## 250 HG00276  G/G 16.40569
## 251 HG00331  A/G 31.10134
## 252 NA12751  A/G 35.99067
## 253 HG00181  G/G 25.21931
## 254 HG00346  G/G 24.32857
## 255 NA11920  A/G 26.42877
## 256 HG00326  A/G 26.28329
## 257 NA12347  A/A 35.88457
## 258 NA12716  A/G 20.72639
## 259 HG00142  G/G 19.42882
## 260 HG00309  A/G 21.09140
## 261 HG00315  G/G 26.56993
## 262 HG00338  A/G 23.79292
## 263 NA11995  A/A 32.59723
## 264 NA19209  A/A 36.02549
## 265 NA20540  A/A 23.86454
## 266 NA12890  A/A 28.38114
## 267 HG00250  G/G 13.34557
## 268 NA20769  G/G 16.60507
## 269 HG00138  A/A 25.14243
## 270 NA19200  A/A 51.30170
## 271 NA19144  G/G 24.85165
## 272 NA12815  G/G 21.56943
## 273 NA12043  A/G 18.79569
## 274 HG00350  A/G 29.54042
## 275 NA12383  A/A 28.14811
```

```
## 276 NA19201  A/G 18.78700
## 277 HG00187  A/G 21.41071
## 278 NA06984  A/A 29.18390
## 279 NA20508  A/G 21.29782
## 280 NA19175  G/G 23.95528
## 281 NA20815  A/G 33.91853
## 282 NA12044  A/G 27.20808
## 283 NA18519  G/G 16.18962
## 284 NA20799  A/G 17.14895
## 285 NA20535  G/G 22.53720
## 286 NA19141  A/G 28.72738
## 287 HG00260  G/G 26.04123
## 288 HG00372  G/G  6.67482
## 289 NA07347  A/G 37.73840
## 290 NA07357  A/A 27.09760
## 291 NA20543  A/G 34.14567
## 292 HG00261  G/G 20.07363
## 293 HG00273  G/G 19.76527
## 294 NA12341  A/G 15.36874
## 295 HG00245  A/G 29.50350
## 296 NA19198  A/G 25.70400
## 297 NA20757  A/G 20.07219
## 298 NA11930  A/A 33.89656
## 299 HG00358  G/G 18.50772
## 300 NA18933  A/G 24.53928
## 301 HG00242  A/G 17.84487
## 302 NA20773  A/G 23.35766
## 303 NA12282  A/G 15.71243
## 304 NA19131  A/A 33.48253
## 305 NA18499  A/A 15.43178
## 306 HG00117  A/A 29.45277
## 307 NA19121  G/G 20.14146
## 308 NA20515  G/G 18.07151
## 309 HG00355  A/G 19.89034
## 310 NA12775  A/G 25.37234
## 311 NA12005  A/G 16.12745
## 312 NA11893  A/G 24.18529
## 313 NA20808  A/G 21.97051
## 314 NA10847  G/G  6.94390
## 315 NA19102  A/G 13.08172
## 316 NA12400  G/G 22.14277
## 317 NA18487  A/G 32.00764
## 318 NA19093  A/G 30.59653
## 319 HG00342  G/G 14.23742
## 320 NA19160  A/G 29.74443
## 321 NA19095  A/G 27.88354
## 322 HG00160  A/A 26.80283
## 323 NA20766  A/G 11.12451
## 324 NA12717  A/G  7.07505
## 325 HG00125  A/G 23.13726
## 326 HG00171  A/G 21.09331
## 327 NA12873  A/G  8.20002
## 328 NA20525  A/G 20.62572
## 329 NA20826  A/G 18.24345
```

```
## 330 HG00136  G/G 19.85388
## 331 HG00272  A/G 11.13478
## 332 NA12340  A/A 43.51943
## 333 HG00251  A/G 24.43943
## 334 HG00369  A/G 22.24289
## 335 NA20803  A/G 24.67325
## 336 NA12842  A/G 41.03924
## 337 HG00146  A/A 45.80808
## 338 HG01790  A/G 33.31795
## 339 NA20809  A/G 27.98844
## 340 NA20765  G/G 27.73467
## 341 HG00362  A/A 26.55972
## 342 HG00114  A/G 31.57994
## 343 NA18917  A/A 24.87330
## 344 NA18502  G/G 19.02064
## 345 HG00150  A/G 36.73337
## 346 NA20527  A/A 29.99549
## 347 HG00179  A/G 18.45322
## 348 NA20805  A/A 26.68589
## 349 NA19117  A/G 23.60431
## 350 HG00285  A/G 24.33489
## 351 NA20772  G/G 14.49816
## 352 NA19213  A/G 35.74662
## 353 HG00344  A/G 22.75684
## 354 NA12156  A/A 39.37193
## 355 HG00257  G/G 26.78940
## 356 NA18486  G/G 20.84709
## 357 HG00188  G/G 10.77316
## 358 HG00366  A/G 34.42403
## 359 HG00157  A/A 38.39523
## 360 HG00262  A/A 41.23635
## 361 HG00280  G/G 12.82128
## 362 HG00308  G/G 16.90256
## 363 NA11831  A/G 25.34866
## 364 NA18910  G/G 29.60045
## 365 NA20795  A/G 25.06486
## 366 HG00231  A/G 36.78028
## 367 NA19197  A/G 30.67131
## 368 HG00101  A/A 27.13936
## 369 HG00281  G/G 14.81945
## 370 NA20760  A/A 36.55643
## 371 HG00176  A/A 28.34688
## 372 NA18489  A/G 37.82860
## 373 NA12275  G/G 17.46326
## 374 NA20514  A/A 15.42908
## 375 HG00351  G/G 23.26922
## 376 HG00186  G/G 21.39806
## 377 NA20586  A/G 25.44086
## 378 HG00275  G/G 18.06320
## 379 HG00325  G/G 15.91528
## 380 NA19118  G/G 24.80823
## 381 HG00124  G/G 26.04514
## 382 NA20785  A/A 47.50579
## 383 HG02215  G/G 18.28089
```

```
## 384 HG00253  A/A 30.15754
## 385 HG00134  G/G 23.24907
## 386 HG00339  A/A 34.88439
## 387 NA20519  A/G 29.49548
## 388 NA12778  A/G 23.27255
## 389 NA18861  A/A 29.29955
## 390 NA20539  A/A 32.87767
## 391 NA11931  G/G 17.91118
## 392 NA20812  A/G 28.69506
## 393 HG00120  G/G 21.09502
## 394 HG00103  A/G 26.52036
## 395 HG00328  A/G 27.49975
## 396 NA20774  A/G 24.66196
## 397 NA18873  A/G 25.81562
## 398 NA20502  A/G 22.49429
## 399 HG00143  A/G 26.88264
## 400 HG00145  A/A 43.43665
## 401 NA19225  A/A 26.56050
## 402 NA12829  A/G 28.98200
## 403 HG00137  A/G 34.31875
## 404 NA20524  A/G 26.40231
## 405 HG00379  A/A 21.87746
## 406 NA18505  A/G 21.67621
## 407 HG01334  A/G 27.56805
## 408 NA18907  A/A 33.42582
## 409 NA19204  A/A 25.38406
## 410 NA12874  A/G 16.16277
## 411 NA20506  A/G 18.28963
## 412 NA20770  A/A 18.20442
## 413 NA12776  A/G 30.55183
## 414 NA18934  A/G 20.70871
## 415 NA19153  A/G 17.66476
## 416 HG00356  A/G 22.79543
## 417 NA12283  A/G 24.03419
## 418 HG00284  A/G 18.02351
## 419 NA12489  A/G 21.63102
## 420 HG00104  A/A 21.62336
## 421 NA20582  G/G 24.74366
## 422 NA11840  A/G 27.54976
## 423 HG00383  A/G 14.79717
## 424 NA20786  A/A 35.80093
## 425 NA20802  A/G 25.34921
## 426 NA20756  A/A 32.26844
## 427 NA19113  A/G 21.34916
## 428 NA12889  G/G 27.40521
## 429 NA12718  A/G 21.20080
## 430 HG00266  A/G 28.36006
## 431 NA12287  A/G 22.43773
## 432 HG00319  A/G 25.56306
## 433 NA12762  A/A 34.40756
## 434 HG00334  A/G 19.50634
## 435 NA12006  G/G 24.85772
## 436 NA19108  G/G 23.08482
## 437 NA19185  A/G 28.93651
```

```
## 438 HG00246  A/G 31.79897
## 439 NA12045  A/G 30.80067
## 440 NA19257  A/G 33.95134
## 441 NA12413  A/G 39.43243
## 442 HG00159  A/A 23.99631
## 443 NA20811  A/A 11.39643
## 444 HG00149  A/G 23.91465
## 445 NA19223  A/G 20.97560
## 446 NA07346  G/G 16.56929
## 447 NA20536  A/G 20.02507
## 448 HG01791  A/A 35.24632
## 449 HG00271  A/G 33.44170
## 450 HG00373  A/G 17.32813
## 451 HG00182  A/A 23.38376
## 452 HG00110  A/G 32.61856
## 453 NA20819  A/G 36.77906
## 454 HG00154  G/G 16.69044
## 455 HG00330  A/G 16.84776
## 456 NA12750  A/A 34.94395
## 457 HG00233  G/G 25.08880
## 458 HG00131  G/G 32.78519
## 459 HG00108  A/A 31.92036
## 460 HG00119  A/G 31.53069
## 461 NA19130  A/A 44.27738
## 462 HG00239  A/G 23.18250
```

First try at this question. Is the mean expression different based on genotype?

```
x$geno == "G/G"
```

```
##   [1] FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE
##  [13] FALSE FALSE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE
##  [25] FALSE FALSE FALSE  TRUE  TRUE FALSE  TRUE  TRUE FALSE FALSE  TRUE FALSE
##  [37] FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE  TRUE  TRUE FALSE
##  [49]  TRUE  TRUE FALSE FALSE FALSE FALSE FALSE  TRUE  TRUE FALSE FALSE FALSE
##  [61]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE
##  [73]  TRUE FALSE FALSE FALSE  TRUE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE
##  [85]  TRUE FALSE FALSE FALSE  TRUE FALSE FALSE  TRUE  TRUE FALSE FALSE FALSE
##  [97] FALSE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE  TRUE  TRUE FALSE FALSE
## [109]  TRUE  TRUE  TRUE FALSE FALSE  TRUE  TRUE FALSE  TRUE  TRUE  TRUE FALSE
## [121] FALSE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE  TRUE
## [133] FALSE FALSE  TRUE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE
## [145] FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE FALSE  TRUE
## [157] FALSE FALSE  TRUE FALSE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE FALSE
## [169] FALSE  TRUE  TRUE  TRUE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE FALSE
## [181] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE
## [193]  TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE FALSE  TRUE FALSE FALSE FALSE
## [205] FALSE FALSE  TRUE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE
## [217] FALSE  TRUE FALSE FALSE FALSE FALSE FALSE  TRUE  TRUE FALSE FALSE FALSE
## [229] FALSE FALSE FALSE  TRUE  TRUE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE
## [241]  TRUE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE FALSE
## [253]  TRUE  TRUE FALSE FALSE FALSE FALSE  TRUE FALSE  TRUE FALSE FALSE FALSE
## [265] FALSE FALSE  TRUE  TRUE FALSE FALSE  TRUE  TRUE FALSE FALSE FALSE FALSE
```

```
## [277] FALSE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE  TRUE FALSE  TRUE  TRUE
## [289] FALSE FALSE FALSE  TRUE  TRUE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE
## [301] FALSE FALSE FALSE FALSE FALSE FALSE  TRUE  TRUE FALSE FALSE FALSE FALSE
## [313] FALSE  TRUE FALSE  TRUE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE
## [325] FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE
## [337] FALSE FALSE FALSE  TRUE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE
## [349] FALSE FALSE  TRUE FALSE FALSE FALSE  TRUE  TRUE  TRUE FALSE FALSE FALSE
## [361]  TRUE  TRUE FALSE  TRUE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE
## [373]  TRUE FALSE  TRUE  TRUE FALSE  TRUE  TRUE  TRUE  TRUE FALSE  TRUE FALSE
## [385]  TRUE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE  TRUE FALSE FALSE FALSE
## [397] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
## [409] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
## [421]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE
## [433] FALSE FALSE  TRUE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
## [445] FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE
## [457]  TRUE  TRUE FALSE FALSE FALSE FALSE
```

```
summary(x[x$geno =="G/G",]$exp)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   6.675  16.903  20.074  20.594  24.457  33.956
```

Now we will look at the other genotypes

```
table(x$geno)
```

```
##
## A/A A/G G/G
## 108 233 121
```

```
summary(x[x$geno == "A/A",3])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   11.40   27.02   31.25   31.82   35.92   51.52
```

```
summary(x[x$geno == "A/G",3])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   7.075  20.626  25.065  25.397  30.552  48.034
```

```
summary(x[x$geno == "G/G",3])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   6.675  16.903  20.074  20.594  24.457  33.956
```

Make a summary overview figure

Make a boxplot figure...

```
library(ggplot2)

ggplot(x) + aes(geno, exp, fill = geno) + geom_boxplot(notch = TRUE)
```