

# Hw 1

*Tyler Poelking*

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## Question 1

- a. 5 out of the 26 letters in the alphabet are vowels. So there is a  $5/26 = 0.1923 = 19.23\%$  chance the
- b. 21 of the 26 letters in the alphabet are consonants. So there is a  $21/26 = 0.8077 = 80.77\%$  chance the
- c.  $12/26 = 0.4615 = 46.15\%$  chance the letter occurs in the last 12 positions of the alphabet
- d. b,c,d,f, g, and h are the 6 consonants in between 'a' and 'i' in the conventional ordering, so the p

## Question 2

The size of the sample space of the experiment with replacement is  $n^r$ , where n=the number of things to

To find the probability that the first letter drawn precedes the second letter in the conventional order

The size of the sample space of the experiment without replacement is equal to  $26 * 25$ , since there are

To find the probability that the first letter drawn precedes the second letter in the conventional order

## Question 3

- a. There are 10 integers (0-9). The probability of choosing any one number (including an 8) one time is  $1/10 = 0.1$ . The probability of drawing an 8 and then an 8 again is  $(1/10) * (1/10) = 0.01$ . Finally, the probability of drawing an 8 twice then an 8 again is  $(1/10) * (1/10) * (1/10) = 0.001$ .

```
set.seed(42)

#sample 3 million times
values <- sample(0:9,3000000,TRUE)

#create matrix that simulated drawing 3 numbers 1 million times
samples <- matrix(values, nrow = 1000000, byrow = TRUE)

#get total count each 3 number draw occurred in simulation
x1 <- data.frame(table(apply(samples, 1, paste, collapse = ", ")))

#transform count to % frequency
x1[2] <- x1[2]/1000000

#display Note: 8,8,8 found on page 89
x1
```

```
##      Var1      Freq
## 1  0, 0, 0 0.000986
## 2  0, 0, 1 0.001000
## 3  0, 0, 2 0.000975
## 4  0, 0, 3 0.001069
## 5  0, 0, 4 0.000993
## 6  0, 0, 5 0.001025
```

## 7 0, 0, 6 0.001063  
## 8 0, 0, 7 0.001007  
## 9 0, 0, 8 0.001020  
## 10 0, 0, 9 0.000981  
## 11 0, 1, 0 0.000988  
## 12 0, 1, 1 0.000989  
## 13 0, 1, 2 0.000985  
## 14 0, 1, 3 0.001028  
## 15 0, 1, 4 0.001007  
## 16 0, 1, 5 0.000939  
## 17 0, 1, 6 0.000960  
## 18 0, 1, 7 0.000958  
## 19 0, 1, 8 0.000970  
## 20 0, 1, 9 0.001038  
## 21 0, 2, 0 0.000970  
## 22 0, 2, 1 0.000980  
## 23 0, 2, 2 0.001035  
## 24 0, 2, 3 0.001029  
## 25 0, 2, 4 0.001012  
## 26 0, 2, 5 0.001008  
## 27 0, 2, 6 0.000998  
## 28 0, 2, 7 0.000963  
## 29 0, 2, 8 0.000971  
## 30 0, 2, 9 0.000986  
## 31 0, 3, 0 0.001036  
## 32 0, 3, 1 0.000987  
## 33 0, 3, 2 0.001047  
## 34 0, 3, 3 0.001036  
## 35 0, 3, 4 0.000979  
## 36 0, 3, 5 0.001007  
## 37 0, 3, 6 0.001015  
## 38 0, 3, 7 0.001012  
## 39 0, 3, 8 0.001015  
## 40 0, 3, 9 0.000998  
## 41 0, 4, 0 0.001028  
## 42 0, 4, 1 0.000978  
## 43 0, 4, 2 0.001013  
## 44 0, 4, 3 0.001000  
## 45 0, 4, 4 0.000969  
## 46 0, 4, 5 0.000993  
## 47 0, 4, 6 0.001003  
## 48 0, 4, 7 0.000964  
## 49 0, 4, 8 0.001006  
## 50 0, 4, 9 0.000987  
## 51 0, 5, 0 0.001032  
## 52 0, 5, 1 0.000971  
## 53 0, 5, 2 0.000951  
## 54 0, 5, 3 0.000976  
## 55 0, 5, 4 0.000972  
## 56 0, 5, 5 0.000995  
## 57 0, 5, 6 0.000997  
## 58 0, 5, 7 0.001028  
## 59 0, 5, 8 0.001021  
## 60 0, 5, 9 0.000965

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## 61 0, 6, 0 0.000994
## 62 0, 6, 1 0.001038
## 63 0, 6, 2 0.000970
## 64 0, 6, 3 0.000968
## 65 0, 6, 4 0.001020
## 66 0, 6, 5 0.000979
## 67 0, 6, 6 0.001017
## 68 0, 6, 7 0.000991
## 69 0, 6, 8 0.001024
## 70 0, 6, 9 0.001029
## 71 0, 7, 0 0.001001
## 72 0, 7, 1 0.001072
## 73 0, 7, 2 0.000983
## 74 0, 7, 3 0.000978
## 75 0, 7, 4 0.001039
## 76 0, 7, 5 0.000990
## 77 0, 7, 6 0.001000
## 78 0, 7, 7 0.000945
## 79 0, 7, 8 0.001035
## 80 0, 7, 9 0.000960
## 81 0, 8, 0 0.000997
## 82 0, 8, 1 0.001010
## 83 0, 8, 2 0.001000
## 84 0, 8, 3 0.001011
## 85 0, 8, 4 0.001022
## 86 0, 8, 5 0.001023
## 87 0, 8, 6 0.000979
## 88 0, 8, 7 0.000982
## 89 0, 8, 8 0.001039
## 90 0, 8, 9 0.001003
## 91 0, 9, 0 0.001032
## 92 0, 9, 1 0.000953
## 93 0, 9, 2 0.001027
## 94 0, 9, 3 0.001008
## 95 0, 9, 4 0.000955
## 96 0, 9, 5 0.000991
## 97 0, 9, 6 0.000990
## 98 0, 9, 7 0.001039
## 99 0, 9, 8 0.000994
## 100 0, 9, 9 0.001042
## 101 1, 0, 0 0.000994
## 102 1, 0, 1 0.000981
## 103 1, 0, 2 0.001031
## 104 1, 0, 3 0.001062
## 105 1, 0, 4 0.000962
## 106 1, 0, 5 0.001019
## 107 1, 0, 6 0.001004
## 108 1, 0, 7 0.001028
## 109 1, 0, 8 0.001062
## 110 1, 0, 9 0.000962
## 111 1, 1, 0 0.001006
## 112 1, 1, 1 0.000976
## 113 1, 1, 2 0.000990
## 114 1, 1, 3 0.000989
```

## 115 1, 1, 4 0.001082  
## 116 1, 1, 5 0.001070  
## 117 1, 1, 6 0.000987  
## 118 1, 1, 7 0.001004  
## 119 1, 1, 8 0.000953  
## 120 1, 1, 9 0.000991  
## 121 1, 2, 0 0.000949  
## 122 1, 2, 1 0.000967  
## 123 1, 2, 2 0.000982  
## 124 1, 2, 3 0.000991  
## 125 1, 2, 4 0.001000  
## 126 1, 2, 5 0.000960  
## 127 1, 2, 6 0.001006  
## 128 1, 2, 7 0.000979  
## 129 1, 2, 8 0.000983  
## 130 1, 2, 9 0.001000  
## 131 1, 3, 0 0.000951  
## 132 1, 3, 1 0.001026  
## 133 1, 3, 2 0.000985  
## 134 1, 3, 3 0.000973  
## 135 1, 3, 4 0.001000  
## 136 1, 3, 5 0.001007  
## 137 1, 3, 6 0.001012  
## 138 1, 3, 7 0.000961  
## 139 1, 3, 8 0.000925  
## 140 1, 3, 9 0.001003  
## 141 1, 4, 0 0.001014  
## 142 1, 4, 1 0.000970  
## 143 1, 4, 2 0.000997  
## 144 1, 4, 3 0.001034  
## 145 1, 4, 4 0.001016  
## 146 1, 4, 5 0.000912  
## 147 1, 4, 6 0.001055  
## 148 1, 4, 7 0.001010  
## 149 1, 4, 8 0.001025  
## 150 1, 4, 9 0.000972  
## 151 1, 5, 0 0.000985  
## 152 1, 5, 1 0.000993  
## 153 1, 5, 2 0.001041  
## 154 1, 5, 3 0.001015  
## 155 1, 5, 4 0.000993  
## 156 1, 5, 5 0.000981  
## 157 1, 5, 6 0.001036  
## 158 1, 5, 7 0.001008  
## 159 1, 5, 8 0.001015  
## 160 1, 5, 9 0.001016  
## 161 1, 6, 0 0.000985  
## 162 1, 6, 1 0.000968  
## 163 1, 6, 2 0.000951  
## 164 1, 6, 3 0.001010  
## 165 1, 6, 4 0.000954  
## 166 1, 6, 5 0.001008  
## 167 1, 6, 6 0.000967  
## 168 1, 6, 7 0.001020

## 169 1, 6, 8 0.001006  
## 170 1, 6, 9 0.000987  
## 171 1, 7, 0 0.001005  
## 172 1, 7, 1 0.000995  
## 173 1, 7, 2 0.001018  
## 174 1, 7, 3 0.001002  
## 175 1, 7, 4 0.000983  
## 176 1, 7, 5 0.001000  
## 177 1, 7, 6 0.001002  
## 178 1, 7, 7 0.000972  
## 179 1, 7, 8 0.000978  
## 180 1, 7, 9 0.001029  
## 181 1, 8, 0 0.000992  
## 182 1, 8, 1 0.001068  
## 183 1, 8, 2 0.000973  
## 184 1, 8, 3 0.000948  
## 185 1, 8, 4 0.000996  
## 186 1, 8, 5 0.001013  
## 187 1, 8, 6 0.000952  
## 188 1, 8, 7 0.000978  
## 189 1, 8, 8 0.001043  
## 190 1, 8, 9 0.001017  
## 191 1, 9, 0 0.000959  
## 192 1, 9, 1 0.000961  
## 193 1, 9, 2 0.001006  
## 194 1, 9, 3 0.001019  
## 195 1, 9, 4 0.000975  
## 196 1, 9, 5 0.000961  
## 197 1, 9, 6 0.000985  
## 198 1, 9, 7 0.001025  
## 199 1, 9, 8 0.000975  
## 200 1, 9, 9 0.001004  
## 201 2, 0, 0 0.000985  
## 202 2, 0, 1 0.001038  
## 203 2, 0, 2 0.000999  
## 204 2, 0, 3 0.001023  
## 205 2, 0, 4 0.001025  
## 206 2, 0, 5 0.000993  
## 207 2, 0, 6 0.000960  
## 208 2, 0, 7 0.000933  
## 209 2, 0, 8 0.001033  
## 210 2, 0, 9 0.001036  
## 211 2, 1, 0 0.000995  
## 212 2, 1, 1 0.000981  
## 213 2, 1, 2 0.000972  
## 214 2, 1, 3 0.001015  
## 215 2, 1, 4 0.001000  
## 216 2, 1, 5 0.000962  
## 217 2, 1, 6 0.000982  
## 218 2, 1, 7 0.000930  
## 219 2, 1, 8 0.000977  
## 220 2, 1, 9 0.001021  
## 221 2, 2, 0 0.000955  
## 222 2, 2, 1 0.000981

## 223 2, 2, 2 0.000956  
## 224 2, 2, 3 0.000974  
## 225 2, 2, 4 0.000974  
## 226 2, 2, 5 0.000953  
## 227 2, 2, 6 0.001034  
## 228 2, 2, 7 0.000981  
## 229 2, 2, 8 0.000977  
## 230 2, 2, 9 0.000997  
## 231 2, 3, 0 0.000961  
## 232 2, 3, 1 0.001056  
## 233 2, 3, 2 0.000994  
## 234 2, 3, 3 0.000948  
## 235 2, 3, 4 0.001003  
## 236 2, 3, 5 0.001001  
## 237 2, 3, 6 0.000992  
## 238 2, 3, 7 0.000944  
## 239 2, 3, 8 0.001039  
## 240 2, 3, 9 0.001003  
## 241 2, 4, 0 0.000968  
## 242 2, 4, 1 0.001013  
## 243 2, 4, 2 0.000985  
## 244 2, 4, 3 0.001036  
## 245 2, 4, 4 0.001019  
## 246 2, 4, 5 0.001000  
## 247 2, 4, 6 0.000971  
## 248 2, 4, 7 0.001006  
## 249 2, 4, 8 0.001000  
## 250 2, 4, 9 0.001078  
## 251 2, 5, 0 0.000985  
## 252 2, 5, 1 0.001007  
## 253 2, 5, 2 0.000978  
## 254 2, 5, 3 0.001012  
## 255 2, 5, 4 0.001024  
## 256 2, 5, 5 0.001040  
## 257 2, 5, 6 0.000979  
## 258 2, 5, 7 0.001020  
## 259 2, 5, 8 0.000964  
## 260 2, 5, 9 0.001007  
## 261 2, 6, 0 0.001018  
## 262 2, 6, 1 0.000986  
## 263 2, 6, 2 0.000976  
## 264 2, 6, 3 0.000964  
## 265 2, 6, 4 0.000973  
## 266 2, 6, 5 0.000996  
## 267 2, 6, 6 0.000967  
## 268 2, 6, 7 0.001030  
## 269 2, 6, 8 0.001026  
## 270 2, 6, 9 0.001002  
## 271 2, 7, 0 0.000969  
## 272 2, 7, 1 0.001044  
## 273 2, 7, 2 0.001048  
## 274 2, 7, 3 0.000988  
## 275 2, 7, 4 0.001006  
## 276 2, 7, 5 0.001022

## 277 2, 7, 6 0.001028  
## 278 2, 7, 7 0.001025  
## 279 2, 7, 8 0.000938  
## 280 2, 7, 9 0.001017  
## 281 2, 8, 0 0.000970  
## 282 2, 8, 1 0.000977  
## 283 2, 8, 2 0.000977  
## 284 2, 8, 3 0.001042  
## 285 2, 8, 4 0.001008  
## 286 2, 8, 5 0.001016  
## 287 2, 8, 6 0.000947  
## 288 2, 8, 7 0.000990  
## 289 2, 8, 8 0.000977  
## 290 2, 8, 9 0.000988  
## 291 2, 9, 0 0.000992  
## 292 2, 9, 1 0.001023  
## 293 2, 9, 2 0.000959  
## 294 2, 9, 3 0.000983  
## 295 2, 9, 4 0.001008  
## 296 2, 9, 5 0.000967  
## 297 2, 9, 6 0.000997  
## 298 2, 9, 7 0.001026  
## 299 2, 9, 8 0.000997  
## 300 2, 9, 9 0.001006  
## 301 3, 0, 0 0.000993  
## 302 3, 0, 1 0.000981  
## 303 3, 0, 2 0.001019  
## 304 3, 0, 3 0.001013  
## 305 3, 0, 4 0.001015  
## 306 3, 0, 5 0.000962  
## 307 3, 0, 6 0.000976  
## 308 3, 0, 7 0.000939  
## 309 3, 0, 8 0.001011  
## 310 3, 0, 9 0.000967  
## 311 3, 1, 0 0.001001  
## 312 3, 1, 1 0.001047  
## 313 3, 1, 2 0.001007  
## 314 3, 1, 3 0.001008  
## 315 3, 1, 4 0.000976  
## 316 3, 1, 5 0.000972  
## 317 3, 1, 6 0.000964  
## 318 3, 1, 7 0.001025  
## 319 3, 1, 8 0.000985  
## 320 3, 1, 9 0.001012  
## 321 3, 2, 0 0.001014  
## 322 3, 2, 1 0.000960  
## 323 3, 2, 2 0.001068  
## 324 3, 2, 3 0.001009  
## 325 3, 2, 4 0.001002  
## 326 3, 2, 5 0.001028  
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## 328 3, 2, 7 0.001022  
## 329 3, 2, 8 0.001022  
## 330 3, 2, 9 0.000981

## 331 3, 3, 0 0.000981  
## 332 3, 3, 1 0.001063  
## 333 3, 3, 2 0.000976  
## 334 3, 3, 3 0.001013  
## 335 3, 3, 4 0.000995  
## 336 3, 3, 5 0.000997  
## 337 3, 3, 6 0.001063  
## 338 3, 3, 7 0.001011  
## 339 3, 3, 8 0.001006  
## 340 3, 3, 9 0.000992  
## 341 3, 4, 0 0.001068  
## 342 3, 4, 1 0.001057  
## 343 3, 4, 2 0.000994  
## 344 3, 4, 3 0.000983  
## 345 3, 4, 4 0.000999  
## 346 3, 4, 5 0.001043  
## 347 3, 4, 6 0.001032  
## 348 3, 4, 7 0.001013  
## 349 3, 4, 8 0.000978  
## 350 3, 4, 9 0.001029  
## 351 3, 5, 0 0.001063  
## 352 3, 5, 1 0.000998  
## 353 3, 5, 2 0.001022  
## 354 3, 5, 3 0.000979  
## 355 3, 5, 4 0.000978  
## 356 3, 5, 5 0.001021  
## 357 3, 5, 6 0.001015  
## 358 3, 5, 7 0.001048  
## 359 3, 5, 8 0.001024  
## 360 3, 5, 9 0.001025  
## 361 3, 6, 0 0.001000  
## 362 3, 6, 1 0.000968  
## 363 3, 6, 2 0.001080  
## 364 3, 6, 3 0.000964  
## 365 3, 6, 4 0.000997  
## 366 3, 6, 5 0.000962  
## 367 3, 6, 6 0.001040  
## 368 3, 6, 7 0.001021  
## 369 3, 6, 8 0.000981  
## 370 3, 6, 9 0.000954  
## 371 3, 7, 0 0.000998  
## 372 3, 7, 1 0.000981  
## 373 3, 7, 2 0.000968  
## 374 3, 7, 3 0.001012  
## 375 3, 7, 4 0.001001  
## 376 3, 7, 5 0.001036  
## 377 3, 7, 6 0.001022  
## 378 3, 7, 7 0.001008  
## 379 3, 7, 8 0.001065  
## 380 3, 7, 9 0.001011  
## 381 3, 8, 0 0.001004  
## 382 3, 8, 1 0.001011  
## 383 3, 8, 2 0.000963  
## 384 3, 8, 3 0.000991



## 385 3, 8, 4 0.001035  
## 386 3, 8, 5 0.001015  
## 387 3, 8, 6 0.000962  
## 388 3, 8, 7 0.001045  
## 389 3, 8, 8 0.000955  
## 390 3, 8, 9 0.000997  
## 391 3, 9, 0 0.000994  
## 392 3, 9, 1 0.001000  
## 393 3, 9, 2 0.000978  
## 394 3, 9, 3 0.001006  
## 395 3, 9, 4 0.000918  
## 396 3, 9, 5 0.001037  
## 397 3, 9, 6 0.000993  
## 398 3, 9, 7 0.001016  
## 399 3, 9, 8 0.000979  
## 400 3, 9, 9 0.001038  
## 401 4, 0, 0 0.001019  
## 402 4, 0, 1 0.001055  
## 403 4, 0, 2 0.001026  
## 404 4, 0, 3 0.000990  
## 405 4, 0, 4 0.001011  
## 406 4, 0, 5 0.000976  
## 407 4, 0, 6 0.000977  
## 408 4, 0, 7 0.001017  
## 409 4, 0, 8 0.001017  
## 410 4, 0, 9 0.001013  
## 411 4, 1, 0 0.000994  
## 412 4, 1, 1 0.000968  
## 413 4, 1, 2 0.000959  
## 414 4, 1, 3 0.001045  
## 415 4, 1, 4 0.001097  
## 416 4, 1, 5 0.000964  
## 417 4, 1, 6 0.000972  
## 418 4, 1, 7 0.000957  
## 419 4, 1, 8 0.001018  
## 420 4, 1, 9 0.000964  
## 421 4, 2, 0 0.000953  
## 422 4, 2, 1 0.001064  
## 423 4, 2, 2 0.001022  
## 424 4, 2, 3 0.001011  
## 425 4, 2, 4 0.000959  
## 426 4, 2, 5 0.000985  
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## 428 4, 2, 7 0.001021  
## 429 4, 2, 8 0.000961  
## 430 4, 2, 9 0.001040  
## 431 4, 3, 0 0.001016  
## 432 4, 3, 1 0.000979  
## 433 4, 3, 2 0.000951  
## 434 4, 3, 3 0.001001  
## 435 4, 3, 4 0.001002  
## 436 4, 3, 5 0.000987  
## 437 4, 3, 6 0.000946  
## 438 4, 3, 7 0.001017

## 439 4, 3, 8 0.000986  
## 440 4, 3, 9 0.001047  
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## 443 4, 4, 2 0.000996  
## 444 4, 4, 3 0.000968  
## 445 4, 4, 4 0.000987  
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## 447 4, 4, 6 0.000960  
## 448 4, 4, 7 0.001036  
## 449 4, 4, 8 0.001041  
## 450 4, 4, 9 0.001024  
## 451 4, 5, 0 0.001053  
## 452 4, 5, 1 0.000990  
## 453 4, 5, 2 0.001048  
## 454 4, 5, 3 0.000968  
## 455 4, 5, 4 0.000973  
## 456 4, 5, 5 0.000951  
## 457 4, 5, 6 0.000983  
## 458 4, 5, 7 0.001010  
## 459 4, 5, 8 0.000964  
## 460 4, 5, 9 0.000987  
## 461 4, 6, 0 0.000987  
## 462 4, 6, 1 0.000995  
## 463 4, 6, 2 0.000990  
## 464 4, 6, 3 0.000970  
## 465 4, 6, 4 0.001021  
## 466 4, 6, 5 0.000993  
## 467 4, 6, 6 0.000965  
## 468 4, 6, 7 0.001015  
## 469 4, 6, 8 0.001001  
## 470 4, 6, 9 0.001006  
## 471 4, 7, 0 0.000988  
## 472 4, 7, 1 0.000948  
## 473 4, 7, 2 0.000965  
## 474 4, 7, 3 0.000990  
## 475 4, 7, 4 0.000997  
## 476 4, 7, 5 0.001020  
## 477 4, 7, 6 0.000979  
## 478 4, 7, 7 0.000995  
## 479 4, 7, 8 0.000979  
## 480 4, 7, 9 0.000988  
## 481 4, 8, 0 0.001054  
## 482 4, 8, 1 0.000959  
## 483 4, 8, 2 0.001063  
## 484 4, 8, 3 0.001029  
## 485 4, 8, 4 0.001005  
## 486 4, 8, 5 0.000948  
## 487 4, 8, 6 0.001011  
## 488 4, 8, 7 0.001029  
## 489 4, 8, 8 0.000991  
## 490 4, 8, 9 0.001009  
## 491 4, 9, 0 0.001027  
## 492 4, 9, 1 0.000945

## 493 4, 9, 2 0.001045  
## 494 4, 9, 3 0.001027  
## 495 4, 9, 4 0.000992  
## 496 4, 9, 5 0.001022  
## 497 4, 9, 6 0.000958  
## 498 4, 9, 7 0.000962  
## 499 4, 9, 8 0.000950  
## 500 4, 9, 9 0.000976  
## 501 5, 0, 0 0.001030  
## 502 5, 0, 1 0.000975  
## 503 5, 0, 2 0.000978  
## 504 5, 0, 3 0.001063  
## 505 5, 0, 4 0.001012  
## 506 5, 0, 5 0.000967  
## 507 5, 0, 6 0.001005  
## 508 5, 0, 7 0.000967  
## 509 5, 0, 8 0.001042  
## 510 5, 0, 9 0.000973  
## 511 5, 1, 0 0.000996  
## 512 5, 1, 1 0.000972  
## 513 5, 1, 2 0.001021  
## 514 5, 1, 3 0.001089  
## 515 5, 1, 4 0.001008  
## 516 5, 1, 5 0.000983  
## 517 5, 1, 6 0.001031  
## 518 5, 1, 7 0.000999  
## 519 5, 1, 8 0.000984  
## 520 5, 1, 9 0.001046  
## 521 5, 2, 0 0.000950  
## 522 5, 2, 1 0.001060  
## 523 5, 2, 2 0.000961  
## 524 5, 2, 3 0.001012  
## 525 5, 2, 4 0.001018  
## 526 5, 2, 5 0.000971  
## 527 5, 2, 6 0.000919  
## 528 5, 2, 7 0.000992  
## 529 5, 2, 8 0.001091  
## 530 5, 2, 9 0.000968  
## 531 5, 3, 0 0.001044  
## 532 5, 3, 1 0.001016  
## 533 5, 3, 2 0.000945  
## 534 5, 3, 3 0.000978  
## 535 5, 3, 4 0.001003  
## 536 5, 3, 5 0.000980  
## 537 5, 3, 6 0.001004  
## 538 5, 3, 7 0.001032  
## 539 5, 3, 8 0.001015  
## 540 5, 3, 9 0.001058  
## 541 5, 4, 0 0.001038  
## 542 5, 4, 1 0.001019  
## 543 5, 4, 2 0.000997  
## 544 5, 4, 3 0.001001  
## 545 5, 4, 4 0.000998  
## 546 5, 4, 5 0.000958

## 547 5, 4, 6 0.000939  
## 548 5, 4, 7 0.001026  
## 549 5, 4, 8 0.001046  
## 550 5, 4, 9 0.001041  
## 551 5, 5, 0 0.001019  
## 552 5, 5, 1 0.001022  
## 553 5, 5, 2 0.000975  
## 554 5, 5, 3 0.000987  
## 555 5, 5, 4 0.001056  
## 556 5, 5, 5 0.001063  
## 557 5, 5, 6 0.001028  
## 558 5, 5, 7 0.001019  
## 559 5, 5, 8 0.000922  
## 560 5, 5, 9 0.000986  
## 561 5, 6, 0 0.001048  
## 562 5, 6, 1 0.000984  
## 563 5, 6, 2 0.001011  
## 564 5, 6, 3 0.001001  
## 565 5, 6, 4 0.000912  
## 566 5, 6, 5 0.001001  
## 567 5, 6, 6 0.001042  
## 568 5, 6, 7 0.001020  
## 569 5, 6, 8 0.000985  
## 570 5, 6, 9 0.000992  
## 571 5, 7, 0 0.000984  
## 572 5, 7, 1 0.001037  
## 573 5, 7, 2 0.001012  
## 574 5, 7, 3 0.000977  
## 575 5, 7, 4 0.000957  
## 576 5, 7, 5 0.000995  
## 577 5, 7, 6 0.000987  
## 578 5, 7, 7 0.001026  
## 579 5, 7, 8 0.000952  
## 580 5, 7, 9 0.000979  
## 581 5, 8, 0 0.001045  
## 582 5, 8, 1 0.000959  
## 583 5, 8, 2 0.001039  
## 584 5, 8, 3 0.000975  
## 585 5, 8, 4 0.000968  
## 586 5, 8, 5 0.000956  
## 587 5, 8, 6 0.000975  
## 588 5, 8, 7 0.001011  
## 589 5, 8, 8 0.000995  
## 590 5, 8, 9 0.001007  
## 591 5, 9, 0 0.001025  
## 592 5, 9, 1 0.000998  
## 593 5, 9, 2 0.001050  
## 594 5, 9, 3 0.000987  
## 595 5, 9, 4 0.001020  
## 596 5, 9, 5 0.000997  
## 597 5, 9, 6 0.000985  
## 598 5, 9, 7 0.001034  
## 599 5, 9, 8 0.000998  
## 600 5, 9, 9 0.000958

## 601 6, 0, 0 0.001029  
## 602 6, 0, 1 0.000971  
## 603 6, 0, 2 0.001031  
## 604 6, 0, 3 0.001003  
## 605 6, 0, 4 0.000952  
## 606 6, 0, 5 0.001005  
## 607 6, 0, 6 0.001010  
## 608 6, 0, 7 0.000948  
## 609 6, 0, 8 0.001019  
## 610 6, 0, 9 0.001005  
## 611 6, 1, 0 0.000994  
## 612 6, 1, 1 0.001003  
## 613 6, 1, 2 0.001010  
## 614 6, 1, 3 0.000987  
## 615 6, 1, 4 0.000993  
## 616 6, 1, 5 0.000931  
## 617 6, 1, 6 0.001008  
## 618 6, 1, 7 0.000946  
## 619 6, 1, 8 0.001048  
## 620 6, 1, 9 0.000954  
## 621 6, 2, 0 0.000957  
## 622 6, 2, 1 0.001022  
## 623 6, 2, 2 0.000968  
## 624 6, 2, 3 0.001024  
## 625 6, 2, 4 0.000951  
## 626 6, 2, 5 0.001019  
## 627 6, 2, 6 0.001008  
## 628 6, 2, 7 0.000950  
## 629 6, 2, 8 0.001022  
## 630 6, 2, 9 0.001071  
## 631 6, 3, 0 0.000999  
## 632 6, 3, 1 0.000992  
## 633 6, 3, 2 0.001023  
## 634 6, 3, 3 0.001019  
## 635 6, 3, 4 0.000968  
## 636 6, 3, 5 0.000960  
## 637 6, 3, 6 0.001010  
## 638 6, 3, 7 0.000992  
## 639 6, 3, 8 0.001026  
## 640 6, 3, 9 0.000969  
## 641 6, 4, 0 0.000974  
## 642 6, 4, 1 0.000994  
## 643 6, 4, 2 0.000951  
## 644 6, 4, 3 0.000975  
## 645 6, 4, 4 0.000986  
## 646 6, 4, 5 0.001015  
## 647 6, 4, 6 0.000967  
## 648 6, 4, 7 0.001028  
## 649 6, 4, 8 0.001014  
## 650 6, 4, 9 0.000994  
## 651 6, 5, 0 0.001012  
## 652 6, 5, 1 0.001038  
## 653 6, 5, 2 0.001050  
## 654 6, 5, 3 0.001036

## 655 6, 5, 4 0.001004  
## 656 6, 5, 5 0.001032  
## 657 6, 5, 6 0.001010  
## 658 6, 5, 7 0.001045  
## 659 6, 5, 8 0.001043  
## 660 6, 5, 9 0.001040  
## 661 6, 6, 0 0.001018  
## 662 6, 6, 1 0.000983  
## 663 6, 6, 2 0.001025  
## 664 6, 6, 3 0.000996  
## 665 6, 6, 4 0.000985  
## 666 6, 6, 5 0.000994  
## 667 6, 6, 6 0.000972  
## 668 6, 6, 7 0.001013  
## 669 6, 6, 8 0.000999  
## 670 6, 6, 9 0.000898  
## 671 6, 7, 0 0.000957  
## 672 6, 7, 1 0.001022  
## 673 6, 7, 2 0.001068  
## 674 6, 7, 3 0.000963  
## 675 6, 7, 4 0.001020  
## 676 6, 7, 5 0.001028  
## 677 6, 7, 6 0.001012  
## 678 6, 7, 7 0.000991  
## 679 6, 7, 8 0.000941  
## 680 6, 7, 9 0.001019  
## 681 6, 8, 0 0.001072  
## 682 6, 8, 1 0.000961  
## 683 6, 8, 2 0.000982  
## 684 6, 8, 3 0.000977  
## 685 6, 8, 4 0.000966  
## 686 6, 8, 5 0.001034  
## 687 6, 8, 6 0.001007  
## 688 6, 8, 7 0.000978  
## 689 6, 8, 8 0.001014  
## 690 6, 8, 9 0.000981  
## 691 6, 9, 0 0.001056  
## 692 6, 9, 1 0.000984  
## 693 6, 9, 2 0.001012  
## 694 6, 9, 3 0.000990  
## 695 6, 9, 4 0.000999  
## 696 6, 9, 5 0.000981  
## 697 6, 9, 6 0.001014  
## 698 6, 9, 7 0.000963  
## 699 6, 9, 8 0.000981  
## 700 6, 9, 9 0.000991  
## 701 7, 0, 0 0.001022  
## 702 7, 0, 1 0.001027  
## 703 7, 0, 2 0.000995  
## 704 7, 0, 3 0.000996  
## 705 7, 0, 4 0.000987  
## 706 7, 0, 5 0.001040  
## 707 7, 0, 6 0.001013  
## 708 7, 0, 7 0.001013

## 709 7, 0, 8 0.001065  
## 710 7, 0, 9 0.001028  
## 711 7, 1, 0 0.000996  
## 712 7, 1, 1 0.000999  
## 713 7, 1, 2 0.001000  
## 714 7, 1, 3 0.001037  
## 715 7, 1, 4 0.001015  
## 716 7, 1, 5 0.000987  
## 717 7, 1, 6 0.001047  
## 718 7, 1, 7 0.001021  
## 719 7, 1, 8 0.000988  
## 720 7, 1, 9 0.000955  
## 721 7, 2, 0 0.001023  
## 722 7, 2, 1 0.001001  
## 723 7, 2, 2 0.000963  
## 724 7, 2, 3 0.000944  
## 725 7, 2, 4 0.000993  
## 726 7, 2, 5 0.000995  
## 727 7, 2, 6 0.001004  
## 728 7, 2, 7 0.000957  
## 729 7, 2, 8 0.000981  
## 730 7, 2, 9 0.001006  
## 731 7, 3, 0 0.001011  
## 732 7, 3, 1 0.001025  
## 733 7, 3, 2 0.000957  
## 734 7, 3, 3 0.001012  
## 735 7, 3, 4 0.001007  
## 736 7, 3, 5 0.000974  
## 737 7, 3, 6 0.001034  
## 738 7, 3, 7 0.001013  
## 739 7, 3, 8 0.000916  
## 740 7, 3, 9 0.001006  
## 741 7, 4, 0 0.001019  
## 742 7, 4, 1 0.000968  
## 743 7, 4, 2 0.000976  
## 744 7, 4, 3 0.000969  
## 745 7, 4, 4 0.001024  
## 746 7, 4, 5 0.000997  
## 747 7, 4, 6 0.001028  
## 748 7, 4, 7 0.000961  
## 749 7, 4, 8 0.001019  
## 750 7, 4, 9 0.001077  
## 751 7, 5, 0 0.000995  
## 752 7, 5, 1 0.000982  
## 753 7, 5, 2 0.001011  
## 754 7, 5, 3 0.001039  
## 755 7, 5, 4 0.000975  
## 756 7, 5, 5 0.000995  
## 757 7, 5, 6 0.001029  
## 758 7, 5, 7 0.001034  
## 759 7, 5, 8 0.001013  
## 760 7, 5, 9 0.001001  
## 761 7, 6, 0 0.000990  
## 762 7, 6, 1 0.000985

## 763 7, 6, 2 0.001005  
## 764 7, 6, 3 0.000967  
## 765 7, 6, 4 0.001006  
## 766 7, 6, 5 0.001012  
## 767 7, 6, 6 0.000988  
## 768 7, 6, 7 0.000964  
## 769 7, 6, 8 0.001036  
## 770 7, 6, 9 0.001039  
## 771 7, 7, 0 0.001027  
## 772 7, 7, 1 0.001028  
## 773 7, 7, 2 0.000940  
## 774 7, 7, 3 0.001043  
## 775 7, 7, 4 0.001038  
## 776 7, 7, 5 0.001013  
## 777 7, 7, 6 0.000957  
## 778 7, 7, 7 0.000953  
## 779 7, 7, 8 0.001021  
## 780 7, 7, 9 0.001026  
## 781 7, 8, 0 0.001032  
## 782 7, 8, 1 0.000991  
## 783 7, 8, 2 0.000990  
## 784 7, 8, 3 0.001000  
## 785 7, 8, 4 0.001003  
## 786 7, 8, 5 0.001042  
## 787 7, 8, 6 0.000981  
## 788 7, 8, 7 0.000952  
## 789 7, 8, 8 0.001075  
## 790 7, 8, 9 0.001000  
## 791 7, 9, 0 0.000993  
## 792 7, 9, 1 0.001003  
## 793 7, 9, 2 0.001005  
## 794 7, 9, 3 0.001061  
## 795 7, 9, 4 0.000959  
## 796 7, 9, 5 0.001003  
## 797 7, 9, 6 0.001016  
## 798 7, 9, 7 0.001040  
## 799 7, 9, 8 0.001007  
## 800 7, 9, 9 0.000985  
## 801 8, 0, 0 0.001009  
## 802 8, 0, 1 0.000999  
## 803 8, 0, 2 0.000964  
## 804 8, 0, 3 0.001025  
## 805 8, 0, 4 0.001047  
## 806 8, 0, 5 0.001005  
## 807 8, 0, 6 0.001003  
## 808 8, 0, 7 0.001041  
## 809 8, 0, 8 0.000953  
## 810 8, 0, 9 0.001003  
## 811 8, 1, 0 0.000969  
## 812 8, 1, 1 0.000930  
## 813 8, 1, 2 0.001026  
## 814 8, 1, 3 0.000973  
## 815 8, 1, 4 0.000995  
## 816 8, 1, 5 0.000988



## 817 8, 1, 6 0.001025  
## 818 8, 1, 7 0.001056  
## 819 8, 1, 8 0.001014  
## 820 8, 1, 9 0.001001  
## 821 8, 2, 0 0.001045  
## 822 8, 2, 1 0.001023  
## 823 8, 2, 2 0.001032  
## 824 8, 2, 3 0.000941  
## 825 8, 2, 4 0.000996  
## 826 8, 2, 5 0.001044  
## 827 8, 2, 6 0.000988  
## 828 8, 2, 7 0.000979  
## 829 8, 2, 8 0.000985  
## 830 8, 2, 9 0.001012  
## 831 8, 3, 0 0.001032  
## 832 8, 3, 1 0.001046  
## 833 8, 3, 2 0.001012  
## 834 8, 3, 3 0.000978  
## 835 8, 3, 4 0.000978  
## 836 8, 3, 5 0.001044  
## 837 8, 3, 6 0.001039  
## 838 8, 3, 7 0.000990  
## 839 8, 3, 8 0.001015  
## 840 8, 3, 9 0.001042  
## 841 8, 4, 0 0.000995  
## 842 8, 4, 1 0.001031  
## 843 8, 4, 2 0.000952  
## 844 8, 4, 3 0.001046  
## 845 8, 4, 4 0.001005  
## 846 8, 4, 5 0.001009  
## 847 8, 4, 6 0.000964  
## 848 8, 4, 7 0.000966  
## 849 8, 4, 8 0.000992  
## 850 8, 4, 9 0.000981  
## 851 8, 5, 0 0.001021  
## 852 8, 5, 1 0.001017  
## 853 8, 5, 2 0.001043  
## 854 8, 5, 3 0.000973  
## 855 8, 5, 4 0.000977  
## 856 8, 5, 5 0.001005  
## 857 8, 5, 6 0.000985  
## 858 8, 5, 7 0.001030  
## 859 8, 5, 8 0.000992  
## 860 8, 5, 9 0.001014  
## 861 8, 6, 0 0.001010  
## 862 8, 6, 1 0.000926  
## 863 8, 6, 2 0.001014  
## 864 8, 6, 3 0.001001  
## 865 8, 6, 4 0.000990  
## 866 8, 6, 5 0.000977  
## 867 8, 6, 6 0.001030  
## 868 8, 6, 7 0.000936  
## 869 8, 6, 8 0.000928  
## 870 8, 6, 9 0.000960

## 871 8, 7, 0 0.000982  
## 872 8, 7, 1 0.001016  
## 873 8, 7, 2 0.000997  
## 874 8, 7, 3 0.000979  
## 875 8, 7, 4 0.001012  
## 876 8, 7, 5 0.000968  
## 877 8, 7, 6 0.000914  
## 878 8, 7, 7 0.001047  
## 879 8, 7, 8 0.000986  
## 880 8, 7, 9 0.001017  
## 881 8, 8, 0 0.001029  
## 882 8, 8, 1 0.001003  
## 883 8, 8, 2 0.000965  
## 884 8, 8, 3 0.000990  
## 885 8, 8, 4 0.001023  
## 886 8, 8, 5 0.001031  
## 887 8, 8, 6 0.001023  
## 888 8, 8, 7 0.001049  
## 889 8, 8, 8 0.001006  
## 890 8, 8, 9 0.001041  
## 891 8, 9, 0 0.000959  
## 892 8, 9, 1 0.001029  
## 893 8, 9, 2 0.001012  
## 894 8, 9, 3 0.000978  
## 895 8, 9, 4 0.001024  
## 896 8, 9, 5 0.000999  
## 897 8, 9, 6 0.000968  
## 898 8, 9, 7 0.001053  
## 899 8, 9, 8 0.001018  
## 900 8, 9, 9 0.000973  
## 901 9, 0, 0 0.000973  
## 902 9, 0, 1 0.001040  
## 903 9, 0, 2 0.001003  
## 904 9, 0, 3 0.001026  
## 905 9, 0, 4 0.000963  
## 906 9, 0, 5 0.001012  
## 907 9, 0, 6 0.001015  
## 908 9, 0, 7 0.000981  
## 909 9, 0, 8 0.001016  
## 910 9, 0, 9 0.001008  
## 911 9, 1, 0 0.001000  
## 912 9, 1, 1 0.001018  
## 913 9, 1, 2 0.000990  
## 914 9, 1, 3 0.001020  
## 915 9, 1, 4 0.001001  
## 916 9, 1, 5 0.001042  
## 917 9, 1, 6 0.001040  
## 918 9, 1, 7 0.000998  
## 919 9, 1, 8 0.001000  
## 920 9, 1, 9 0.001009  
## 921 9, 2, 0 0.000987  
## 922 9, 2, 1 0.000980  
## 923 9, 2, 2 0.000990  
## 924 9, 2, 3 0.000960

## 925 9, 2, 4 0.001031  
## 926 9, 2, 5 0.000996  
## 927 9, 2, 6 0.000958  
## 928 9, 2, 7 0.001017  
## 929 9, 2, 8 0.001026  
## 930 9, 2, 9 0.001048  
## 931 9, 3, 0 0.001022  
## 932 9, 3, 1 0.001045  
## 933 9, 3, 2 0.000976  
## 934 9, 3, 3 0.000984  
## 935 9, 3, 4 0.000995  
## 936 9, 3, 5 0.001007  
## 937 9, 3, 6 0.001008  
## 938 9, 3, 7 0.000995  
## 939 9, 3, 8 0.001044  
## 940 9, 3, 9 0.001008  
## 941 9, 4, 0 0.000994  
## 942 9, 4, 1 0.000988  
## 943 9, 4, 2 0.001060  
## 944 9, 4, 3 0.000940  
## 945 9, 4, 4 0.001029  
## 946 9, 4, 5 0.001000  
## 947 9, 4, 6 0.000949  
## 948 9, 4, 7 0.001004  
## 949 9, 4, 8 0.000971  
## 950 9, 4, 9 0.000977  
## 951 9, 5, 0 0.001021  
## 952 9, 5, 1 0.001003  
## 953 9, 5, 2 0.001051  
## 954 9, 5, 3 0.001000  
## 955 9, 5, 4 0.000986  
## 956 9, 5, 5 0.000999  
## 957 9, 5, 6 0.000971  
## 958 9, 5, 7 0.001003  
## 959 9, 5, 8 0.000994  
## 960 9, 5, 9 0.001028  
## 961 9, 6, 0 0.001004  
## 962 9, 6, 1 0.000994  
## 963 9, 6, 2 0.000981  
## 964 9, 6, 3 0.001068  
## 965 9, 6, 4 0.001002  
## 966 9, 6, 5 0.001020  
## 967 9, 6, 6 0.001000  
## 968 9, 6, 7 0.000943  
## 969 9, 6, 8 0.001062  
## 970 9, 6, 9 0.001069  
## 971 9, 7, 0 0.000986  
## 972 9, 7, 1 0.000963  
## 973 9, 7, 2 0.000984  
## 974 9, 7, 3 0.001033  
## 975 9, 7, 4 0.001049  
## 976 9, 7, 5 0.000942  
## 977 9, 7, 6 0.000970  
## 978 9, 7, 7 0.000988

```
## 979 9, 7, 8 0.000992
## 980 9, 7, 9 0.001012
## 981 9, 8, 0 0.000978
## 982 9, 8, 1 0.000961
## 983 9, 8, 2 0.001037
## 984 9, 8, 3 0.001023
## 985 9, 8, 4 0.001014
## 986 9, 8, 5 0.001005
## 987 9, 8, 6 0.000986
## 988 9, 8, 7 0.001018
## 989 9, 8, 8 0.000949
## 990 9, 8, 9 0.000993
## 991 9, 9, 0 0.000956
## 992 9, 9, 1 0.001029
## 993 9, 9, 2 0.000997
## 994 9, 9, 3 0.000945
## 995 9, 9, 4 0.000997
## 996 9, 9, 5 0.001026
## 997 9, 9, 6 0.000949
## 998 9, 9, 7 0.001024
## 999 9, 9, 8 0.000953
## 1000 9, 9, 9 0.001037
```

First we pick 3 million integers randomly sampled between 0-9, which a uniform distribution. We then re

Question 4

One of the largest factors of winning games is the players that make up the team. I would start by asking