# The Birthday Problem

In class, we saw that the probability of having a birthday match in a group of $n$ people was

$$1 - \frac{P(365, n)}{365^n}$$

The following table shows the computed probabilities for selected values of $n$.

| $n$ | Probability |
|---|---|
| 1 | 0 |
| 2 | .002739726027 |
| 3 | .008204165885 |
| 4 | .01635591247 |
| 5 | .02713557370 |
| 6 | .04046248365 |
| 7 | .05623570310 |
| 8 | .07433529235 |
| 9 | .09462383389 |
| 10 | .1169481777 |
| 11 | .1411413783 |
| 12 | .1670247888 |
| 13 | .1944102752 |
| 14 | .2231025120 |
| 15 | .2529013198 |
| 16 | .2836040053 |
| 17 | .3150076653 |
| 18 | .3469114179 |
| 19 | .3791185260 |
| 20 | .4114383836 |
| 21 | .4436883352 |
| 22 | .4756953077 |
| 23 | .5072972343 |
| 24 | .5383442579 |
| 25 | .5686997040 |

| $n$ | Probability |
|---|---|
| 26 | .5982408201 |
| 27 | .6268592823 |
| 28 | .6544614723 |
| 29 | .6809685375 |
| 30 | .7063162427 |
| 31 | .7304546337 |
| 32 | .7533475279 |
| 33 | .7749718542 |
| 34 | .7953168646 |
| 35 | .8143832389 |
| 36 | .8321821064 |
| 37 | .8487340082 |
| 38 | .8640678211 |
| 39 | .8782196644 |
| 40 | .8912318098 |
| 41 | .9031516115 |
| 42 | .9140304716 |
| 43 | .9239228557 |
| 44 | .9328853686 |
| 45 | .9409758995 |
| 46 | .9482528434 |
| 47 | .9547744028 |
| 48 | .9605979729 |
| 49 | .9657796093 |
| 50 | .9703735796 |

EXERCISE: Test your calculator skills and see if you can verify a few of the entries in the table using the formula at the top of the page. Better yet, write a computer program to do the work for you.