Birthday Paradox

The birthday paradox is a famous problem in probability. I found the introduction on Wikipedia quite easy to follow: [https://en.wikipedia.org/wiki/Birthday_problem](https://en.wikipedia.org/wiki/Birthday_problem). For those of you who do not know the Pigeon hole principle, it is actually a very simple idea: If you have \( n \) holes and if you have \( n + 1 \) pigeons, then at least one hole will have two or more pigeon. (See, again, Wikipedia for a good introduction: [https://en.wikipedia.org/wiki/Pigeonhole_principle](https://en.wikipedia.org/wiki/Pigeonhole_principle)).

MATLAB code for class demonstration

Some of you may wonder how I generate the simulation in MATLAB. There is actually no secret:

```matlab
clear all
close all
clc

n = 365;
k = 40;

X = sort(randi(n,1,k));
fprintf('In a class of %3g students, their birthdays are on day \n', k);
for i=1:k
    if mod(i,10)==0
        fprintf('
');
    else
        fprintf('%3g 	', X(i));
    end
end
fprintf('
');
```

See if you have any difficulty in understanding this piece of code.

Applications of Probability and Statistics

Chapter 1.5 of the textbook contains many interesting examples of how probability and statistics are used in engineering. Take a look at these and you will be more convinced that ECE 302 is actually a very useful course!