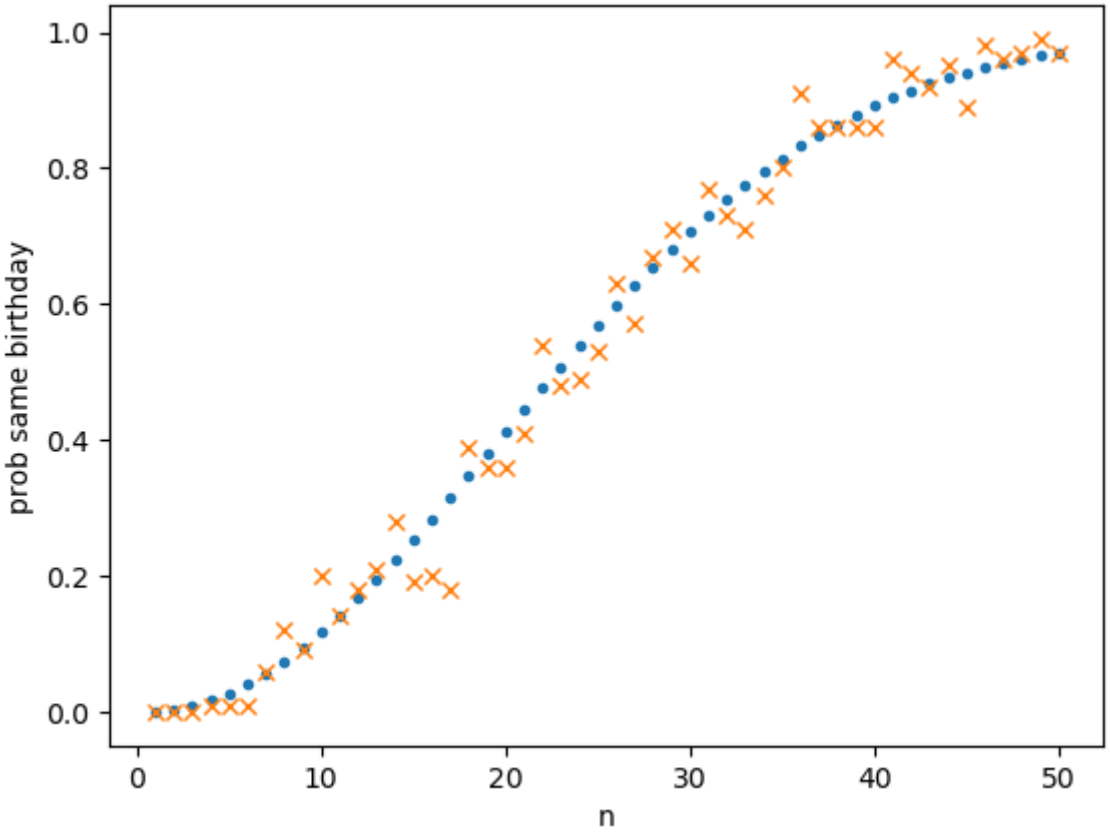
The Birthday Problem through direct calculation and Monte Carlo

In [1]:

```
using Combinatorics, PyPlot

function sameBirthDayChance(n)
    return 1 - factorial(365,365-n) / (365^n)
end

grid = 1:50
chances =[Float64(sameBirthDayChance(big(n))) for n in grid]
xlabel("n")
ylabel("prob same birthday")
PyPlot.plot(grid,chances,".");

using StatsBase
dates = 1:365;

#A random outcome of an experiment: True if there are people with same birthday
#                                   False otherwise
function bdEvent(n)
    cnt = counts(sample(dates,n))
    return sum([c > 1 for c in cnt]) > 0  #If there exists at least one greater than 1
end

NN = 10^2

function probEst(n)
    return sum([bdEvent(n) for _ in 1:NN])/NN
end

ests = [probEst(n) for n in grid];



PyPlot.plot(grid,ests,"x");
```


prob same birthday
n
0.0
0.2
0.4
0.6
0.8
1.0
0
10
20
30
40
50