# Photos Problem

## Statement of Problem

In summary, pictures are selected at random from among 19,134 possible unique pictures and displayed on a computer screen using a screen-saver. Let $X$ be the number of pictures you need to view until you see the same one at least twice.

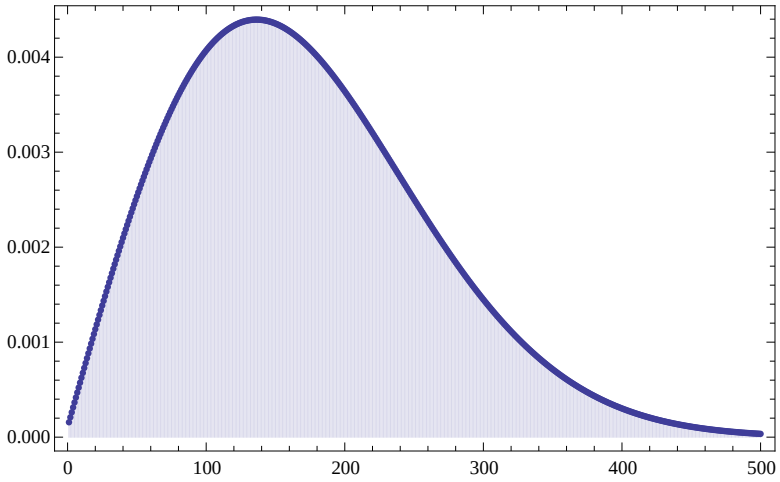
## Solution

```
p = 19134;
k = Range[p];

y = Table[{r - 1, 1 - (Times @@ ((p - Range[k[[r]]]) / N[p]))}, {r, 2, p}];

pf = Transpose[{Range[p - 2], Differences[(Last /@ y)]}];

ListPlot[Take[pf, 500], Filling → Axis,
 PlotRange → All, Axes → False, Frame → True, AxesOrigin → {0, 0}]
```




mean

```
μ = Total[Times[Sequence @@ #] & /@ pf]
```

```
171.033
```

```
prob = Last /@ pf;

Take[prob, 10];
```

Variance

```
Sqrt[Total[(Range[1, Length[prob]] - μ)^2 × prob]]
```

```
90.2771
```

Probability that $X$ is less than 160 or 161 is about 50%

```
{Total[Take[prob, 160]], Total[Take[prob, 161]]}
```

```
{0.499264, 0.503529}
```