

The file ex912 (Maxima program)

```
kill(all);
lambda : .5;
k : 3;
sum : 0;
  for i : 0 step 1 thru k do(
    sum : float(sum+lambda^i/i!));
  goodbox : float(sum*exp(-lambda));
badbox : 1-goodbox;
trial : 10000;
expect : trial * badbox;
standdev : sqrt(trial * goodbox*badbox);
limit : 25.5;
standlim : (limit-expect)/standdev;
func : 1/sqrt(2*%pi)*exp(-t^2/2);
normdist(x) := 1/2+romberg(func,t,0,x);
badboxtoofew : normdist(standlim);
badboxtoomany : 1-badboxtoofew;
```

The output of the Maxima program ex912

```
Maxima 5.38.1 http://maxima.sourceforge.net
using Lisp GNU Common Lisp (GCL) GCL 2.6.12
Distributed under the GNU Public License. See the file COPYING.
Dedicated to the memory of William Schelter.
The function bug_report() provides bug reporting information.
(%i1) batch("ex912")
```

```
read and interpret file: #p/home/mate/exams/f18/maxima/81/ex912
(%i2) kill(all)
(%o0) done
(%i1) lambda:0.5
(%o1) 0.5
(%i2) k:3
(%o2) 3
(%i3) sum:0
(%o3) 0
(%i4) for i from 0 thru k do sum:float(sum+lambda^i/i!)
(%o4) done
(%i5) goodbox:float(sum*exp(-lambda))
(%o5) 0.9982483774437091
(%i6) badbox:1-goodbox
(%o6) 0.00175162255629091
(%i7) trial:10000
(%o7) 10000
(%i8) expect:trial*badbox
(%o8) 17.5162255629091
(%i9) standdev:sqrt(trial*goodbox*badbox)
(%o9) 4.181571922986861
(%i10) limit:25.5
(%o10) 25.5
(%i11) standlim:(limit-expect)/standdev
(%o11) 1.909275885750675
(%i12) func:(1/sqrt(2*%pi))*exp((-t^2)/2)
(%o12)

$$\frac{e^{-\frac{t^2}{2}}}{\sqrt{2} \sqrt{\pi}}$$

(%i13) normdist(x) := 1/2+romberg(func,t,0,x)
(%o13) normdist(x) := - + romberg(func, t, 0, x)
```

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```
(%i14) badboxtoofew:normdist(standlim)
(%o14) 0.9718867434212506
(%i15) badboxtoomany:1-badboxtoofew
(%o15) 0.02811325657874941
(%o15) ex912
```