

The file pval_prop (Maxima program)

```
kill(all);
load(distrib);
n : 500;
testprob : 1/3;
x : 187;
"Normal approxomation"$
standnorm : float((abs(x-n*testprob)-.5)/sqrt(n*testprob*(1-testprob)));
confidence_level : float(cdf_normal(standnorm, 0, 1));
"significance level or p-value:"$
pvalue_2sided : 2*(1-confidence_level);
pvalue_1sided : 1-confidence_level;
"Exact calculation"$
binprob(n, p, k) := float(binomial(n,k)*p^k*(1-p)^(n-k));
bindist(n, p, lower, upper) :=
do(
  sum : 0,
  for i : lower step 1 thru upper do(
    term : binprob(n, p, i),
    sum : float(sum+term)), return(sum)
);
pval_upper : bindist(n, testprob, x, n);
```

The output of the Maxima program pval_prop

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

read and interpret file: #p/home/mate/exams/s19/maxima/81/pvalue/pval_prop
(%i2) kill(all)
(%o0) done
(%i1) load(distrib)
(%o1) /usr/share/maxima/5.38.1/share/distrib/distrib.mac
(%i2) n:500
(%o2) 500
(%i3) testprob:1/3
(%o3) 1
      -
      3
(%i4) x:187
(%o4) 187
(%i5) "Normal approxomation"
(%i6) standnorm:float((abs(x-n*testprob)-0.5)/sqrt(n*testprob*(1-testprob)))
(%o6) 1.881555207800185
(%i7) confidence_level:float(cdf_normal(standnorm,0,1))
(%o7) 0.9700517836247133
(%i8) "significance level or p-value:"
(%i9) pvalue_2sided:2*(1-confidence_level)
(%o9) 0.05989643275057332
(%i10) pvalue_1sided:1-confidence_level
(%o10) 0.02994821637528666
(%i11) "Exact calculation"
(%i12) binprob(n,p,k):=float(binomial(n,k)*p^k*(1-p)^(n-k))
(%o12) binprob(n, p, k) := float(binomial(n, k) pk (1 - p)n - k)
(%i13) bindist(n,p,lower,upper):=do
(sum:0,
for i from lower thru upper do
(term:binprob(n,p,i),sum:float(sum+term)),return(sum))
(%o13) bindist(n, p, lower, upper) := do (sum : 0,
```

```
for i from lower thru upper do (term : binprob(n, p, i),
sum : float(sum + term)), return(sum)
(%i14) pval_upper:bindist(n,testprob,x,n)
(%o14) 0.03078974854280337
(%o14) pval_prop
```