

1. Plot, using a  $\log_{10}$  (vertical) scale, the absolute error of Euler-Maclaurin approximation to compute  $\ln \Gamma(13)$ , up to and including the

$$\frac{B_{2j}}{2j(2j-1)n^{2j-1}}$$

term, for  $j$  from 0 to 55.

2. Expand the pmf of

$$Z_n = \frac{X - \frac{n}{p}}{\sqrt{\frac{n}{p}(\frac{1}{p} - 1)}}$$

(where  $X$  is Negative Binomial with parameters  $n$  and  $p$ , i.e. the sum of  $n$  independent Geometric-type RVs) in powers of  $\frac{1}{\sqrt{n}}$ , up to and including the  $\frac{1}{n}$  term. Display the errors of this approximation (together with the basic Normal, and the  $\frac{1}{\sqrt{n}}$ -accurate approximations) in the original  $X$  scale, using  $n = 12$  and  $p = 0.35$ .