1. Without Maple, express κ_9 in terms of the corresponding central moments (give the details of your computation). Similarly, find $H_7(z)$ and $H_8(z)$.

2. Consider the following distribution

$X =$	-1	0	1	2
Pr:	0.4	0.2	0.3	0.1

   Find the basic Normal, $\frac{1}{\sqrt{n}}$ and $\frac{1}{n}$-accurate approximation for the PMF of $S \equiv \sum_{i=1}^{n} X_n$ (spell it out for me in terms of z, where $z =$ ... and the range of s is ...) and the corresponding maximum error.

3. Find the first 4 cumulants of the Negative Binomial distribution with parameters n and p and using these, construct the $\frac{1}{n}$-accurate approximation to the corresponding PMF (again, spell it out in terms of z, where $z =$ ... and the range of x is ...). Verify that your answers for the $\frac{1}{\sqrt{n}}$ and $\frac{1}{n}$-proportional terms agree with results of your previous assignment.

4. Consider a RIS of size n from a distribution with the following PDF

$$f(x) = \begin{cases} 12x^2(1-x) & 0 < x < 1 \\ 0 & \text{otherwise} \end{cases}$$

   Compute the first 4 cumulants of this distribution (note that you can bypass the exact MGF if necessary - all you need is its expansion up to and including the

$$\mathbb{E}(X^4)\frac{t^4}{4}$$

   term; simple moments are always easy to compute). Using these, find the basic Normal, $\frac{1}{\sqrt{n}}$ and $\frac{1}{n}$-accurate approximations for the PDF of

$$Z = \frac{\bar{X} - \mu}{\sigma/\sqrt{n}}$$

   (spell it out, in terms of z - this time I am not asking you to transform it back to the x scale) and find the maximum error of each of these approximations using $n = 9$. Note that the maximum error is the same whether dealing with Z or $\bar{X}$ - you can establish it in either scale.