1. Find $\lim\_{x\to 0+}x^{x}$. (personal note: I think the approach is to use l’Hopital’s rule)
2. Prove that ***e*** is irrational. (hint: Suppose false, so that ***e*** = $\frac{p}{q}$ where p,q $\in N$. Write $e = e^{1}= P\_{n}\left(1\right)+ R\_{n}\left(1\right)$**,** multiple both sides by n! and deduce a contradiction when n $\in $ $N$ is sufficiently large).
3. Expand the polynomial $p\left(x\right)= 3x^{3}+2x^{2}- x+1 $as a polynomial in powers of (x-1): That is, show that $p\left(x\right)= \sum\_{k=0}^{3}c\_{k}(x-1)^{k}$ and find the values of the constants $c\_{0 }, …,c\_{3} $