**2C Maclaurin Series**

1. Given that f(x) = ex can be written in the form:

$$e^{x}=a\_{0}+a\_{1}x+a\_{2}x^{2}+a\_{3}x^{3}+ .. . + a\_{r}x^{r}$$

And that it is valid to differentiate an infinite series term by term, show that:

$$e^{x}=1+x+\frac{x^{2}}{2!}+\frac{x^{3}}{3!}+ … +\frac{x^{r}}{r!} $$

Generalising:

1. Express ln(1 + x) as an infinite series in ascending powers of x, up to and including the term in x3
2. Using this series, find approximate values for:
3. ln(1.05)
4. ln(1.25)
5. ln(1.8)
6. Find the Maclaurin expansion for sinx, up to the term in x5. Then use your expansion to find an approximation for sin10˚.
7. Find the Maclaurin expansion for cosx, up to the term in x4.
8. Proving Euler’s relation:

$$e^{iθ}=cosθ+isinθ$$