Mathematics 3790H – Analysis I: Introduction to analysis
TRENT UNIVERSITY, Winter 2014

Assignment #7
Due on Friday, 7 March, 2014.

1. Prove that the partial sums of $\displaystyle\sum_{n=0}^{\infty} \sin(n)$ are bounded. *[5]*

2. Use the result stated in **1** to help show that $\displaystyle\sum_{n=2}^{\infty} \frac{\sin(n)}{\ln(n)}$ converges. *[1]*

3. Suppose m is any real number and x is a real variable. Then the *binomial series* for m is

$$\begin{aligned} &1 + mx + \frac{m(m-1)}{2!}x^2 + \frac{m(m-1)(m-2)}{3!}x^3 + \cdots \\ &= 1 + \sum_{k=1}^{\infty} \frac{m(m-1)\cdots(m-k+1)}{k!}x^k . \end{aligned}$$

Show that if $|x| < 1$, then the binomial series converges for all $m \in \mathbb{R}$. *[4]*

NOTE: The binomial series for m is the Taylor series at 0 of $f(x) = (1+x)^m$.