

Math 101 – WORKSHEET 34
TAYLOR SERIES AND LIMITS

1. DERIVATIVES

(1) (Final 2014) Let $\sum_{n=0}^{\infty} c_n x^n$ be the MacLaurin series for e^{3x} . Find c_5 .

(2) (Final 2013) Let $f(x) = x^2 \sin(x^3)$. Find $f^{11}(0)$.

(3) Let $g(x) = \begin{cases} \frac{e^{-x^2}-1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$.

(a) Find $g^{(3)}(0)$.

(b) (2011 Final) Give the first three non-zero terms of the MacLaurin series for $\int g(x) dx$.

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2. LIMITS WITHOUT L'HÔPITAL'S RULE

(4) (Final 2012) Evaluate $\lim_{x \rightarrow 0} \frac{\sin(x) - x + x^3/6}{\sin(x^5)}$

(5) Evaluate $\lim_{x \rightarrow 0} \frac{x \sin x - \log(1+x^2)}{e^{-x^2/2} - \cos(x)}$