

SERIES WORKSHEET 3

Problem 1. Find the first three nonzero terms in the MacLaurin series of $\arctan(x) \cdot \ln(1+x)$ and $\tan x$.

Problem 2. Use Taylor series to compute the limits:

a) $\lim_{x \rightarrow 0} \frac{4x^5 + x^6 - 3x^7}{x - \frac{x^3}{3!} - \sin(x)},$

b) $\lim_{x \rightarrow 1} \frac{(x-1) \ln x}{\sin^2(\pi x)},$

c) $\lim_{x \rightarrow 0} \frac{\tan x - x}{x^3},$

d) $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - \cos(x) - \frac{1}{2} \sin(x)}{\tan^2(x)}.$

Problem 3. Use a second order Taylor polynomial to approximate $\cos(0.1)$ and compute the error bound. What changes if you use T_3 instead?

Problem 4. Approximate $\sqrt[3]{28}$ with an error of at most 0.001. Is the approximation larger or smaller than $\sqrt[3]{28}$?

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