

Math 199 CD3 Merit Worksheet 21: More on Taylor Series, Maclaurin Series, Taylor's Theorem and Approximation Error

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This worksheet is similar to the previous one, with 1 additional task. Pick your favorite integer > 2 and calculate the error of the function if we use the polynomial expansion up to that order to approximate the function

1. Find the first 3 terms Maclaurin series for $f(x) = \sin^2 x$ about $\pi/4$

2. Find the first 3 terms Maclaurin series for $f(x) = \frac{x}{\sqrt{1-x^2}}$

3. Find the first 3 non-zero terms of the Maclaurin series for xe^{-x}

4. Find the first 3 terms Maclaurin series for $\frac{x}{1+x^2}$

5. Find the first 3 terms in the Maclaurin series for $\cos(\sin x)$. Hence or otherwise find

$$\lim_{x \rightarrow 0} \frac{1 - \cos(\sin(x))}{x^2}$$

6. Find the first 3 terms Maclaurin series for $f(x) = \sqrt{1 - x + x^2}$

7. Find the Maclaurin series for the function $\frac{1}{1-x^2}$ by using partial fractions or otherwise