

Math Sheet

Name _____ Score _____ Teacher _____ Date _____

Taylor Series Approximations and Error

Use standard Taylor or Maclaurin series to represent a function, approximate a nearby value, and distinguish the exact target from the polynomial approximation and its error bound.

1. For $f(x)=1/(1-x)$ centered at $a=0$, Write the order-4 Taylor polynomial and the infinite-series representation, state its convergence interval, and verify that $x=1/10$ is inside it. Use the lagrange method for the error statement.

2. For $f(x)=\cos(x)$ centered at $a=0$, Write the order-4 Taylor polynomial and the infinite-series representation, state its convergence interval, and verify that $x=4/5$ is inside it. Use the lagrange method for the error statement.

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3. For $f(x)=\ln(1+x)$ centered at $a=0$, Use the lagrange remainder method to bound the error at the exact point $x=2/5$. Use the lagrange method for the error statement.

4. For $f(x)=e^x$ centered at $a=0$, Write the order-4 Taylor polynomial and the infinite-series representation, state its convergence interval, and verify that $x=9/20$ is inside it. Use the lagrange method for the error statement.

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5. For $f(x)=\cos(x)$ centered at $a=0$, Use the order-4 polynomial to approximate the exact target $f(2/5)=\cos(2/5)$. Use the alternating method for the error statement.

6. For $f(x)=\sin(x)$ centered at $a=0$, Use the lagrange remainder method to bound the error at the exact point $x=2/5$. Use the lagrange method for the error statement.
