Popular Maclaurin Series
and their intervals of convergence!

Write the Maclaurin series for each of the following functions. Show four terms and give the $\Sigma$-notation and state the interval of convergence. Try to do these without looking them up.

**Interval**

$e^x =$

$\sin x =$

$\cos x =$

$\frac{1}{1 - x} =$

(1) Use substitution to find series for each of the following. Show four terms.

(a) $\sin(3x) =$

(b) $e^{4x} =$

(c) $\cos(x/2) =$

(d) $\frac{1}{e^{2x}} =$

(e) $e^{x^2} =$

Please note that the interval of convergence for all of these is still $\mathbb{R}$.
(2) Write the series for \( \frac{1}{1 - 2x} \), showing four terms. Find the interval of convergence, again using substitution.

Write the series for \( \frac{1}{1 + 3x} \). Find the interval of convergence.

Write the series for \( \frac{3}{1 - 2x} \) by writing this as \( \frac{1}{1 - 2x / 3} \). Find the interval of convergence.

(3) Logarithms. (You may need to look this up or derive this.) Show four terms.

<table>
<thead>
<tr>
<th>Series</th>
<th>Interval of convergence</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \ln (1 + x) = )</td>
<td></td>
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<tr>
<td>( \ln (1 + 5x) = )</td>
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</tr>
<tr>
<td>( \ln (1 - x/3) = )</td>
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