

### W7-P1a

$$\text{In[1]:= Series}\left[\frac{1}{1-3x}, \{x, 0, 4\}\right]$$

$$\text{Out[1]= } 1 + 3x + 9x^2 + 27x^3 + 81x^4 + O[x]^5$$

$$\text{In[2]:= SumConvergence}\left[3^n x^n, n\right]$$

$$\text{Out[2]= } \text{Abs}[x] < \frac{1}{3}$$

### W7-P1b

$$\text{Series}\left[\frac{1}{1+5x^2}, \{x, 0, 6\}\right]$$

$$1 - 5x^2 + 25x^4 - 125x^6 + O[x]^7$$

$$\text{SumConvergence}\left[(-5)^n x^{2n}, n\right]$$

$$\text{Abs}[x] < \frac{1}{\sqrt{5}}$$

### W7-P1c

$$\text{Series}\left[\frac{1}{2+x}, \{x, 0, 6\}\right]$$


$$\frac{1}{2} - \frac{x}{4} + \frac{x^2}{8} - \frac{x^3}{16} + \frac{x^4}{32} - \frac{x^5}{64} + \frac{x^6}{128} + O[x]^7$$

$$\text{SumConvergence}\left[\frac{(-x)^n}{2^{n+1}}, n\right]$$

$$\text{Abs}[x] < 2$$

### W7-P2

$$\text{Series}\left[\frac{1}{\text{Exp}[x] + 1}, \{x, 0, 1\}\right] /. \{x \rightarrow \frac{U - \mu}{k T}\}$$

 **SeriesData:** First argument  $\frac{U - \mu}{k T}$  is not a valid variable.

$$\frac{1}{2} - \frac{U - \mu}{4 k T} + O\left[\frac{U - \mu}{k T}\right]^2$$

### W7-P3a

$$\text{SumConvergence}\left[\frac{x^m}{4^m}, m\right]$$

$$\text{Abs}[x] < 4$$

## W7-P3b

`SumConvergence[(-1)^r x^2 r, r]`

`Abs[x] < 1`

## W7-P3c

`SumConvergence[n x^n, n]`

`Abs[x] < 1`

## W7-P3d

`SumConvergence[x^n/n^2, n]`

`Abs[x] ≤ 1`

## W7-P4a

`Series[Sin[x], {x, 0, 7}] // Normal`

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040}$$

`Series[Cos[x], {x, 0, 6}] // Normal`

$$1 - \frac{x^2}{2} + \frac{x^4}{24} - \frac{x^6}{720}$$

## W7-P4b

`D[Series[Sin[x], {x, 0, 7}] // Normal]`

$$1 - \frac{x^2}{2} + \frac{x^4}{24} - \frac{x^6}{720}$$

## W7-P4c

`Integrate[Series[Sin[x], {x, 0, 5}] // Normal, x] + C`

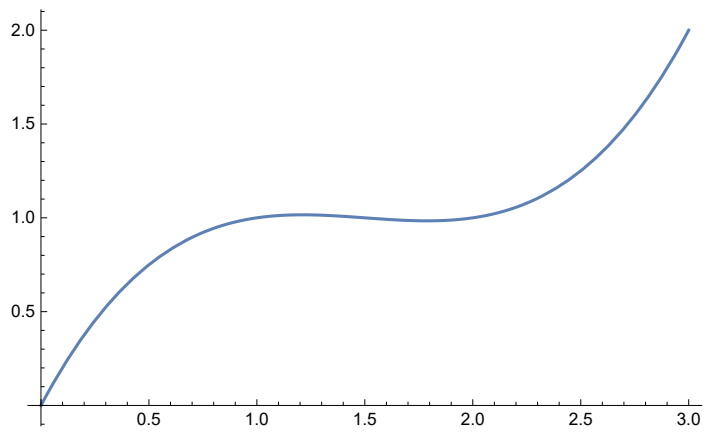
$$C + \frac{x^2}{2} - \frac{x^4}{24} + \frac{x^6}{720}$$

## W7-P5

`y[x_] = InterpolatingPolynomial[{{0, 0}, {1, 1}, {2, 1}, {3, 2}}, x] // Simplify // Expand`

$$\frac{13x}{6} - \frac{3x^2}{2} + \frac{x^3}{3}$$

Plot[y[x], {x, 0, 3}]



y[3/2]

1