

`Sum[ z^k / k! Log[x]^k, {k, 0, Infinity}]`

$x^z$

`f[z_] := 6^z`

`f'''[0]`

`Log[6]^3`

`Sum[ Binomial[z / -2, k] (x^-2 - 1)^k, {k, 0, Infinity}]`

$\left(\frac{1}{x^2}\right)^{-z/2}$

$\left(\frac{1}{x}\right)^{-z} /. z \rightarrow -4$

$\frac{1}{x^4}$

$\left(\frac{1}{x^2}\right)^{-z/2} /. z \rightarrow -3$

$\left(\frac{1}{x^2}\right)^{3/2}$

`Series[ Log[1 + x]^2, {x, 0, 20}]`

$$x^2 - x^3 + \frac{11 x^4}{12} - \frac{5 x^5}{6} + \frac{137 x^6}{180} - \frac{7 x^7}{10} + \frac{363 x^8}{560} - \frac{761 x^9}{1260} + \frac{7129 x^{10}}{12600} -$$

$$\frac{671 x^{11}}{1260} + \frac{83711 x^{12}}{166320} - \frac{6617 x^{13}}{13860} + \frac{1145993 x^{14}}{2522520} - \frac{1171733 x^{15}}{2702700} + \frac{1195757 x^{16}}{2882880} -$$

$$\frac{143327 x^{17}}{360360} + \frac{42142223 x^{18}}{110270160} - \frac{751279 x^{19}}{2042040} + \frac{275295799 x^{20}}{775975200} + O[x]^{21}$$

`f[x_] := x -  $\frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \frac{x^5}{5} - \frac{x^6}{6} + \frac{x^7}{7} - \frac{x^8}{8} +$`

$$\frac{x^9}{9} - \frac{x^{10}}{10} + \frac{x^{11}}{11} - \frac{x^{12}}{12} + \frac{x^{13}}{13} - \frac{x^{14}}{14} + \frac{x^{15}}{15} - \frac{x^{16}}{16} + \frac{x^{17}}{17} - \frac{x^{18}}{18} + \frac{x^{19}}{19} - \frac{x^{20}}{20}$$

`Integrate[f[x], x]`

$$\frac{x^2}{2} - \frac{x^3}{6} + \frac{x^4}{12} - \frac{x^5}{20} + \frac{x^6}{30} - \frac{x^7}{42} + \frac{x^8}{56} - \frac{x^9}{72} + \frac{x^{10}}{90} - \frac{x^{11}}{110} +$$

$$\frac{x^{12}}{132} - \frac{x^{13}}{156} + \frac{x^{14}}{182} - \frac{x^{15}}{210} + \frac{x^{16}}{240} - \frac{x^{17}}{272} + \frac{x^{18}}{306} - \frac{x^{19}}{342} + \frac{x^{20}}{380} - \frac{x^{21}}{420}$$

`f[x_] := Log[1 + x]^2`

`D[Log[1 + x]^2, {x, 5}] / 5! /. x -> 0`

$-\frac{5}{6}$

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K[n_] := If[n == 1, 0, FullSimplify[MangoldtLambda[n] / Log[n]]]
P[n_, k_] := P[n, k] = Sum[K[j] P[Floor[n / j], k - 1], {j, 2, n}]; P[n_, 0] := 1
D2[n_, k_] := D2[n, k] = Sum[D2[Floor[n / j], k - 1], {j, 2, n}]; D2[n_, 0] := 1
DD[n_, z_] := Sum[FactorialPower[z, a] / a! D2[n, a], {a, 0, Log[2, n]}]
P2[n_, j_] := Sum[(D[Log[1 + x]^j, {x, k}] / k! /. x -> 0) D2[n, k], {k, 0, Log[2, n]}]

P2[100, 3]


$$\frac{993}{8}$$

P[100, 3]


$$\frac{993}{8}$$

Limit[(DD[100, x] - 1) / x, x -> 0]


$$\frac{428}{15}$$

Limit[((DD[100, z] - 1) / z - (P[100, 1]))] / z, z -> 0]


$$\frac{16\,289}{360}$$

P2[100, 2]


$$\frac{16\,289}{180}$$

Limit[((DD[100, z] - 1) / z - (Limit[(DD[100, x] - 1) / x, x -> 0]))] / z, z -> 0]


$$\frac{16\,289}{360}$$

Limit[((DD[100, z] - 1) / z - (Limit[(DD[100, z] - 1) / z, z -> 0]))] / z, z -> 0]


$$\frac{16\,289}{360}$$


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