

$w[n\_ , a\_ ] := \text{Sum} [ (E^{(k \text{Log}[a])} - 1) / k, \{k, 1, \text{Log}[n] / \text{Log}[a]\}]$

$w[n, a]$

$-\text{HarmonicNumber} \left[ \frac{\text{Log}[n]}{\text{Log}[a]} \right] - a \, n \, \text{LerchPhi} \left[ a, 1, 1 + \frac{\text{Log}[n]}{\text{Log}[a]} \right] - \text{Log}[1 - a]$

$w2[n\_ , a\_ ] := \text{Sum} [ (E^{(k \text{Log}[a])}) / k, \{k, 1, \text{Log}[n] / \text{Log}[a]\}]$

$w2[n, a]$

$-a \, n \, \text{LerchPhi} \left[ a, 1, 1 + \frac{\text{Log}[n]}{\text{Log}[a]} \right] - \text{Log}[1 - a]$

$w3[n\_ , a\_ ] := \text{Sum} [ a^k / k, \{k, 1, n\}]$

$w3[n, a]$

$-a^{1+n} \text{LerchPhi}[a, 1, 1 + n] - \text{Log}[1 - a]$

$w4[n\_ , a\_ ] := \text{Sum} [ a^k / k, \{k, 1, \text{Infinity}\}]$

$w4[n, a]$

$-\text{Log}[1 - a]$

$w5[n\_ , a\_ ] := \text{Sum} [ a^k / k, \{k, \text{Log}[n] / \text{Log}[a], \text{Infinity}\}]$

$w5[n, a]$

$n \, \text{HurwitzLerchPhi} \left[ a, 1, \frac{\text{Log}[n]}{\text{Log}[a]} \right]$

$w6[n\_ , a\_ ] := \text{Sum} [ a^k / (k a^n), \{k, n, \text{Infinity}\}]$

$w6[n, a]$

$\text{HurwitzLerchPhi}[a, 1, n]$

$w7[n\_ , a\_ ] := \text{Sum} [ 1 / (k a^{(n-k)}), \{k, n, \text{Infinity}\}]$

$w7[n, a]$

$\text{HurwitzLerchPhi}[a, 1, n]$

$w8[n\_ , a\_ ] := \text{Sum} [ 1 / ((k + n) a^{(-k)}), \{k, 0, \text{Infinity}\}]$

$w8[n, a]$

$\text{HurwitzLerchPhi}[a, 1, n]$

$w9[n\_ , a\_ ] := \text{Sum} [ a^k / (k + n), \{k, 0, \text{Infinity}\}]$

$w9[n, a]$

$\text{HurwitzLerchPhi}[a, 1, n]$

$w9a[n\_ , a\_ ] := \text{Sum} [ a^k / (k + \text{Log}[n]), \{k, 0, \text{Infinity}\}]$

$w9a[n, a]$

$\text{HurwitzLerchPhi}[a, 1, \text{Log}[n]]$

$w10[n\_ , a\_ ] := \text{Sum} [ (a^k - 1) / k, \{k, 1, \text{Log}[n] / \text{Log}[a]\}]$

w10[n, a]

$$-\text{HarmonicNumber}\left[\frac{\text{Log}[n]}{\text{Log}[a]}\right] - a^n \text{LerchPhi}\left[a, 1, 1 + \frac{\text{Log}[n]}{\text{Log}[a]}\right] - \text{Log}[1 - a]$$

w11[n\_, a\_] :=

Sum[ (a^k - 1) / k, {k, 1, Infinity}] Sum[ (a^k - 1) / k, {k, Log[n] / Log[a], Infinity}]

w11[n, a]

Sum::div : Sum does not converge. >>

\$Aborted