```
Clear[oo]
oo[n_, s_, 0, y_] := UnitStep[n - 1]
oo[n_, s_, k_, y_] :=
 oo[n, s, k, y] = Sum[Binomial[k, j] y^(-j s) dx[n / y^j, s, k - j, y + 1], {j, 0, k}]
dx[n_, s_, k_, y_] := Sum[ j^-s dx[n / j, s, k - 1, y], {j, y, n}]
dx[n_, s_, 0, y_] := UnitStep[n - 1]

oo[100, -2, 3, 4]

80 944

dx[100, -2, 3, 4]

80 944

Clear[oo]
oo[n_, s_, 0, y_] := UnitStep[n - 1]
oo[n_, s_, z_, y_] :=
 oo[n, s, z, y] = Sum[Binomial[z, j] y^(-(z - j) s) dx[n / y^(z - j), s, j, y + 1], {j, 0, 2 z}]
dx[n_, s_, k_, y_] := Sum[ j^-s dx[n / j, s, k - 1, y], {j, y, n}]
dx[n_, s_, 0, y_] := UnitStep[n - 1]

oo[100, -2, 3, 4]

80 944
```