```
ad[Log[x]^(a + b - j - 1) / (a + b - 1)! /. a → 2 /. b → 3 /. x → 12]
mul[n_, j_] := n / (j + 1)
```

1.58865

```
f[n_, z_, k_, d_, l_, fn_] := f[n, z, k, d, l, fn] =
  If[l < 1, 0, 1 + d ((z + 1) / k - 1) Sum[ f[fn[n, j d], z, k + 1, d, l - 1, fn], {j, 1, (n - 1) / d}]]
```

```
N[D[-1 / x LaguerreL[-z - 1, 1, Log[x]], z] /. z → 0 /. x → 5]
```

0.497068

```
(1 / Log[x] - 1 / (x Log[x])) /. x → 5.
```

0.497068

```
N[D[-1 / x LaguerreL[-7 z - 1, 1, Log[x]], z] /. z → 0 /. x → 5]
```

3.47948

```
7 (1 / Log[x] - 1 / (x Log[x])) /. x → 5.
```

3.47948

```
FullSimplify[
 Sum[Binomial[t - 1, a - 1] Binomial[u - 1, b - 1], {t, 1, x}, {u, 1, x - t}] /. a → 2 /. b → 3]
```

$$\frac{1}{120} (-4+x) (-3+x) (-2+x) (-1+x) x$$

```
Binomial[x, 5]
```

$$\frac{1}{120} (-4+x) (-3+x) (-2+x) (-1+x) x$$

```
FullSimplify@Integrate[ t^(a - 1) / (a - 1)! u^(b - 1) / (b - 1)!, {t, 0, x - 1}, {u, 0, (x - 1) - t}]
```

$$\text{ConditionalExpression}\left[\frac{(-1+x)^{a+b}}{\text{Gamma}[1+a+b]}, \text{Re}[a] > 0 \&\& \text{Re}[b] > -1 \&\& x > 1\right]$$

```
N[
 Integrate[ Log[t]^(a - 1) / (a - 1)! Log[u]^(b - 1) / (b - 1)!, {t, 1, x}, {u, 1, x / t}] /. a → 2 /.
   b → 3 /. x → 12]
```

6.60611

```
(-1)^(2 + 3) Gamma[2 + 3, 0, -Log[12.]] / Gamma[2 + 3]
```

$6.60611 - 4.04508 \times 10^{-15}\, i$

```
Sum[ Pochhammer[t, a - 1] / (a - 1)! Pochhammer[u, b - 1] / (b - 1)!,
    {t, 1, x - 1}, {u, 1, x - 1 - t}] /. a → 2.2 /. b → 3.3 /. x → 7
```

164.023

```
Pochhammer[7 - 1 - 1, 2.2 + 3.3] / (2.2 + 3.3)!
```

164.023

```
Integrate[ t^(a - 1) / (a - 1)! (x - t)^(b - 1) / (b - 1)!, {t, 0, x}]
```

$$\text{ConditionalExpression}\left[\frac{x^{-1+a+b}}{\text{Gamma}[a+b]}, \text{Re}[a] > 0 \&\& \text{Re}[b] > 0 \&\& x > 0\right]$$

```
N[Integrate[ Log[t]^(a - 1) / (a - 1)! Log[x / t]^(b - 1) / (b - 1)!, {t, 1, x}] /. a → 2 /. b → 3 /.
  x → 12]
```

4.87607