```
Clear[x, a, b];
x = 410; a = 3; b = 4;
(* *)
{NIntegrate[ t^(a - 1) / (a - 1)! (x - 1 - t)^(b - 1) / (b - 1)!, {t, 0, x - 1}],
 N@(x - 1)^(a + b - 1) / (a + b - 1)!}
{NIntegrate[ t^(a - 1) / (a - 1)! u^(b - 1) / (b - 1)!, {t, 0, x - 1}, {u, 0, x - 1 - t}],
 N@(x - 1)^(a + b) / (a + b)!}
(* *)
{Sum[Binomial[t - 1, a - 1] Binomial[(x - 1 - t) - 1, b - 1], {t, 1, (x - 1) - 1}],
 Binomial[x - 2, a + b - 1]}
{Sum[Binomial[t - 1, a - 1] Binomial[u - 1, b - 1], {t, 1, x - 1}, {u, 1, x - 1 - t}],
 Binomial[x - 1, a + b]}
(* *)
{NIntegrate[ ((Log[t]^(a - 1)) / ((a - 1)!)) ((Log[x / t]^(b - 1)) / ((b - 1)!)) (1 / t),
  {t, 1, x}], N@Log[x]^(a + b - 1) / (a + b - 1)!}
{NIntegrate[ (Log[t]^(a - 1) / (a - 1)!) (Log[u]^(b - 1) / (b - 1)!), {t, 1, x}, {u, 1, x / t}],
 N@((-1)^(a + b) Gamma[a + b, 0, -Log[x]] / Gamma[a + b])}
(* *)
FI[n_] := FactorInteger[n]; FI[1] := {}
dz[n_, z_] := Product[(-1)^p[[2]] Binomial[-z, p[[2]]], {p, FI[n]}]
d2[n_, k_] := Sum[(-1)^(k - j) Binomial[k, j] dz[n, j], {j, 0, k}]
{Sum[If[1 < t < x, d2[t, a] d2[x / t, b], 0], {t, Divisors[x]}], d2[x, a + b]}
{Sum[d2[t, a] d2[u, b], {t, 2, x}, {u, 2, x / t}], Sum[d2[t, a + b], {t, 2, x}]}
```

$\{6.50141 \times 10^{12},\ 6.50141 \times 10^{12}\}$

$\{3.79868 \times 10^{14},\ 3.79868 \times 10^{14}\}$

{6 174 325 825 668, 6 174 325 825 668}

{360 757 037 528 316, 360 757 037 528 316}

{65.8541, 65.8541}

$\{12\,934.6,\ 12\,934.6 - 1.10882 \times 10^{-11}\ i\}$

{0, 0}

{92, 92}

```
Clear[x, a, b, t]
D[((-1)^(a) Gamma[a, 0, -Log[t]] / Gamma[a]), t]
 D[((-1)^(b) Gamma[b, 0, -Log[x / t]] / Gamma[b]), t]
```

$$-\frac{(-1)^{a+b}\, x\, (-\text{Log}[t])^{-1+a} \left(-\text{Log}\left[\frac{x}{t}\right]\right)^{-1+b}}{t^2\, \text{Gamma}[a]\, \text{Gamma}[b]}$$

```
D[((-1)^(b) Gamma[b, 0, -Log[x / t]] / Gamma[b]), t]
```

$$\frac{(-1)^{b}\, x \left(-\text{Log}\left[\frac{x}{t}\right]\right)^{-1+b}}{t^2\, \text{Gamma}[b]}$$