Computation of $\mathrm{mu}(T) - \mathrm{mu}(T - e)$ **for** *balanced double broom whose stem has order* $n+2$, **and** *with* $2\cdot k$ *leaves*

> $N := (n,k) \to 2\cdot k + \mathrm{binomial}(n+1,2) + 2\cdot 2^k\cdot(1+n) + 2^{2\cdot k};$

$$N := (n,k) \mapsto 2\cdot k + \binom{n+1}{2} + 2\cdot 2^k\cdot(n+1) + 2^{2\cdot k} \tag{1}$$

> $R := (n,k) \to 2\cdot k + \mathrm{binomial}(n+2,3) + 2\cdot 2^k\cdot(n+2+k) + 2^{2\cdot k}\cdot(n+2+k);$

$$R := (n,k) \mapsto 2\cdot k + \binom{n+2}{3} + 2\cdot 2^k\cdot(n+2+k) + 2^{2\cdot k}\cdot(n+2+k) \tag{2}$$

> $\mu := (n,k) \to \dfrac{R(n,k)}{N(n,k)}$

$$\mu := (n,k) \mapsto \frac{R(n,k)}{N(n,k)} \tag{3}$$

> $Dif := (n,k) \to simplify(\mathrm{mu}(n,k) - \mathrm{mu}(n-1,k))$

$$Dif := (n,k) \mapsto simplify\big(\mu(n,k) - \mu(n-1,k)\big) \tag{4}$$

> $Dif(c\cdot 2^k, k)$

$$\Big(\big((12\,k-1)\,c^2 + (-24\,k-32)\,c - 24\,k - 48\big)\,4^k - 12\,2^k\,c\,k + \big(c^4 + 8\,c^3 + 12\big)\,16^k - 12\,8^k\,\big((1+k)\,c + 2\,k\big)\Big) \Big/ \Big(3\,\big((c^2+4\,c+2)\,4^k - c\,2^k + 4\,k\big)\,\big((c^2+4\,c+2)\,4^k + (c+4)\,2^k + 4\,k\big)\Big) \tag{5}$$

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Computation of $\mathrm{mu}(T) - \mathrm{mu}(T - e)$ **for** bT consisting of path of order n-k-1, where one end vertex is connected with k pendent vertices and the y´th vertex, couting from the other end vertex of the path, is connected to a pendent vertex as well,

Nedge qnd Redge is R and N of R

N and R of T-e

> $Nedge := (n,k,y) \to k + \mathrm{binomial}(n-k-2+1,2) + 2^k\cdot(n-k-1) + y\cdot(n-k-y + 2^k) + 1;$

$$Nedge := (n,k,y) \mapsto k + \binom{n-k-1}{2} + 2^k\cdot(n-k-1) + y\cdot(n-k-y+2^k) + 1 \tag{6}$$

> $Redge := (n,k,y) \to k + \mathrm{binomial}(n-k-2+2,3) + 2^k\cdot(n-k-1)\cdot\left(\dfrac{k}{2} + \dfrac{(n-k)}{2}\right) + y\cdot(n-k-y)\cdot\left(1 + \dfrac{(y+1)}{2} + \dfrac{(n-k-y-1)}{2}\right) + y\cdot 2^k\cdot\left(1 + \dfrac{(y+1)}{2} + (n-k-y-1) + \dfrac{k}{2}\right) + 1;$

$$Redge := (n,k,y) \mapsto k + \binom{n-k}{3} + \frac{2^k\cdot(n-k-1)\cdot n}{2} + y\cdot(n-k-y)\cdot\left(1 + \frac{n}{2} - \frac{k}{2}\right) + y \tag{7}$$

$$\cdot 2^{k} \cdot \left(\frac{1}{2} - \frac{y}{2} + n - \frac{k}{2} \right) + 1$$

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> $N := (n, k, y) \rightarrow k + \mathrm{binomial}(n - k - 2 + 1, 2) + 2^{k} \cdot (n - k - 1);$

$$N := (n, k, y) \mapsto k + \binom{n - k - 1}{2} + 2^{k} \cdot (n - k - 1) \qquad (8)$$

> $R := (n, k, y) \rightarrow k + \mathrm{binomial}(n - k - 2 + 2, 3) + 2^{k} \cdot (n - k - 1) \cdot \left(\frac{k}{2} + \frac{(n - k)}{2} \right);$

$$R := (n, k, y) \mapsto k + \binom{n - k}{3} + \frac{2^{k} \cdot (n - k - 1) \cdot n}{2} \qquad (9)$$

> $\mu e := (n, k, y) \rightarrow \frac{Redge(n, k, y)}{Nedge(n, k, y)}$

$$\mu e := (n, k, y) \mapsto \frac{Redge(n, k, y)}{Nedge(n, k, y)} \qquad (10)$$

> $\mu := (n, k, y) \rightarrow \frac{R(n, k, y)}{N(n, k, y)}$

$$\mu := (n, k, y) \mapsto \frac{R(n, k, y)}{N(n, k, y)} \qquad (11)$$

> $Dif := (n, k, y) \rightarrow simplify(\ \mu e(n, k, y) - \mathrm{mu}(n, k, y))$

$$Dif := (n, k, y) \mapsto simplify(\mu e(n, k, y) - \mu(n, k, y)) \qquad (12)$$

> $Dif(c \cdot 2^{k}, k, y)$

$$\Big(12 + (-12 + (-3 c k^{2} - 9 k^{2} + 16 c - 9 k + 6) y^{2} + ((-4 k^{3} - 3 k^{2} + 32 k + 12) c - 7 k^{3} \qquad (13)$$

$$+ 13 k + 6) y + 2 (-3 k^{2} - 12 k - 11) c - 12 k) 2^{k} + (3 (2 + (-1 + k) c^{2} + (-1$$

$$+ 4 k) c + 2 k) y^{2} + ((6 k^{2} - 3 k - 16) c^{2} + (18 k^{2} + 3 k - 13) c + 6 k^{2} - 6) y$$

$$+ 6 c ((k + 2) c + k + 3)) 4^{k} - 4 c \left(\frac{\left(3 + \frac{1}{2} c^{2} + \frac{3}{2} c\right) y^{2}}{2} + \left(\left(k - \frac{3}{4} \right) c^{2} \right.\right.$$

$$\left.\left. + \frac{3 (-1 + 5 k) c}{4} + 3 k \right) y + \frac{c^{2}}{2} + \frac{3 c}{2} \right) 8^{k} + c^{2} y (c^{2} + 4 c + 6) 16^{k} + (k^{3} + 3 k^{2}$$

$$- 16 k - 12) y^{2} + (k^{4} + 3 k^{3} - 16 k^{2} - 12 k) y + 2 k^{3} + 12 k^{2} + 22 k \Big) \Big/ (3 (4 + (-2$$

$$+ 2 (c + 1) y + (-2 k - 3) c - 2 k) 2^{k} + (c^{2} + 2 c) 4^{k} + k^{2} - 2 k y - 2 y^{2} + 5 k) (((($$

$$\mathrm{K}\ 2\,k\,\mathrm{K}\ 3)\,c\,\mathrm{K}\ 2\,k\,\mathrm{K}\ 2)\,2^{k} + \left(c^{2} + 2\,c\right)4^{k} + k^{2} + 5\,k + 2))$$