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DP4 DUC2

$$\sum_{n=0}^{\infty} \frac{n+2}{2^n \cdot (n^2+4n+3)} \quad \text{nolarelle } x=\frac{1}{2} \Rightarrow \sum_{n=0}^{\infty} \frac{x^n \cdot (n+2)}{(n+2)^2-1} =$$

$$= \sum_{n=0}^{\infty} x^n \cdot \frac{(n+2)}{(n+3)(n+1)}$$

$$\frac{n+2}{(n+3)(n+1)} = \frac{a}{n+3} + \frac{b}{n+1} \qquad an+bn+a+3b=n+2$$

$$\Rightarrow a=\frac{1}{2}, \quad b=\frac{1}{2}$$

$$\sum_{n=0}^{+\infty} x^n \cdot \left(\frac{x}{n+3} + \frac{x}{n+1}\right) = \sum_{n=0}^{+\infty} \frac{x^{n+1}}{n+3} + \sum_{n=0}^{+\infty} \frac{x^{n+1}}{n+1} =$$

$$= x^{-1} \cdot \sum_{n=0}^{\infty} \frac{x^{n+3}}{n+3} + \sum_{n=0} \frac{x^{n+1}}{n+1} = m=n+1, \ p=n+3 =$$

$$= x^{-1} \cdot \sum_{p=3}^{\infty} \frac{x^p}{p} + \sum_{m=1} \frac{x^m}{m} = 4 \sum^{+\infty} \frac{x^m}{m} - \log(1-x) =$$

$$= 4\left(\sum_{p=1}^{+\infty} \frac{x^p}{p} - x - \frac{x^2}{2}\right) - \log\left(\frac{1}{2}\right) =$$

$$= 4\left(-\log\frac{1}{2} - \frac{1}{2} - \frac{1}{8}\right) - \log\frac{1}{2} = -4\log\frac{1}{2} - \log\frac{1}{2} - \frac{5}{2} =$$

$$= 5\log 2 - \frac{5}{2} = \frac{5}{2}\left(2\log(2) - 1\right)$$