☙ Transformée en z : corrigé des exemples

Déterminer les transformées en z des suites causales définies par :

$a(n) = (2n+1)u(n)$

$A(z) = 2\dfrac{z}{(z-1)^2} + \dfrac{z}{z-1}$

$b(n) = (n^2+n)u(n)$

$B(z) = \dfrac{z(z+1)}{(z-1)^3} + \dfrac{z}{(z-1)^2}$

$c(n) = 3^n u(n)$

$C(z) = \dfrac{z}{z-3}$

$d(n) = 3^n n u(n)$

$D(z) = \dfrac{\frac{z}{3}}{\left(\frac{z}{3}-1\right)^2} = \dfrac{3z}{(z-3)^2}$

$e(n) = 3^n n^2 u(n)$

$E(z) = \dfrac{\frac{z}{3}\left(\frac{z}{3}+1\right)}{\left(\frac{z}{3}-1\right)^3} = \dfrac{3z(z+3)}{(z-1)^3}$

$f(n) = (2^n + n^2)u(n)$

$F(z) = \dfrac{z}{z-2} + \dfrac{z(z+1)}{(z-1)^3}$

$g(n) = (n-3)u(n-3)$

$G(z) = \dfrac{1}{z^3} \times \dfrac{z}{(z-1)^2} = \dfrac{1}{z^2(z-1)^2}$

$h(n) = (n+1)u(n)$

$H(z) = \dfrac{z}{(z-1)^2} + \dfrac{z}{z-1}$

$i(n) = (n+1)u(n+1)$

$I(z) = z\left(\dfrac{z}{(z-1)^2} - 0u(0)\right) = \dfrac{z^2}{(z-1)^2}$

$\tilde{i}(n) = (n+4)u(n+4)$

$\tilde{I}(z) = z^4\left(\dfrac{z}{(z-1)^2} - 0u(0) - 1u(1)z^{-1} - 2u(2)z^{-2} - 3u(3)z^{-3}\right) = \dfrac{z^5}{(z-1)^2} - z^3 - 2z^2 - 3z$

$j(n) = 4^{n-1}u(n-1)$

$J(z) = \dfrac{1}{z} \times \dfrac{z}{z-4} = \dfrac{1}{z-4}$

$k(n) = 3^{n+2}u(n+2)$

$K(z) = z^2\left(\dfrac{z}{z-3} - 3^0u(0) - 3^1u(1)z^{-1}\right) = \dfrac{z^3}{z-3} - z^2 - 3z$

$l(n) = 3^{n-2}(n-2)u(n-2)$

$L(z) = \dfrac{1}{z^2} \times \dfrac{z}{(z-1)^2} = \dfrac{1}{z(z-1)^2}$