



DEPARTMENT OF MATHEMATICS

UNIT-V Z-TRANSFORM

INVERSE Z-TRANSFORM :

If $z[f(n)] = F(z)$ then $z^{-1}[F(z)] = f(n)$

$$1) z[a^n] = \frac{z}{z-a} \Rightarrow a^n = z^{-1} \left[\frac{z}{z-a} \right]$$

$$2) z[(-a)^n] = \frac{z}{z+a} \Rightarrow (-a)^n = z^{-1} \left[\frac{z}{z+a} \right]$$

$$3) z[n] = \frac{z}{(z-1)^2} \Rightarrow (n) = z^{-1} \left[\frac{z}{(z-1)^2} \right]$$

$$4) z[na^n] = \frac{az}{(z-a)^2}$$

$$5) z[na^{n-1}] = \frac{z}{(z-a)^2}$$



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Method of partial Fraction:

) Find inverse z-transform of $\frac{z-4}{(z+2)(z+3)}$ using partial fraction method (or)
Find $z^{-1} \left[\frac{z-4}{(z+2)(z+3)} \right]$.

$$\frac{z-4}{(z+2)(z+3)} = \frac{A}{z+2} + \frac{B}{z+3}$$

$$z-4 = A(z+3) + B(z+2)$$

$$\text{put } z = -3 \Rightarrow B = 7$$

$$\text{put } z = -2 \Rightarrow A = -6$$

$$\frac{z-4}{(z+2)(z+3)} = -\frac{6}{z+2} + \frac{7}{z+3}$$

$$\begin{aligned} z^{-1} \left[\frac{z-4}{(z+2)(z+3)} \right] &= z^{-1} \left[-\frac{6}{z+2} \right] + 7 z^{-1} \left[\frac{1}{z+3} \right] \\ &= -6(-2)^{n-1} + 7(-3)^{n-1} \end{aligned}$$