Differential Equations and Transforms (BMAT102L)

Module 7-Z-transforms

Tutorial sheet -2

1. Find the inverse Z-transform using the method of partial fractions:
   (i) $\frac{z+1}{z^2-2z+1}$
   (ii) $\frac{4z^3}{(2z-1)^2(z-1)}$
   (iii) $\frac{z(z^2-z+2)}{(z+1)(z-1)^2}$
   (iv) $\frac{z^2+2z}{z^2+2z+4}$
2. Find the inverse Z-transform using Convolution method:
   (i) $\frac{z^2}{(z-2)(z-3)}$
   (ii) $\frac{8z^2}{(2z-1)(4z+1)}$
3. Solve the following difference equations using Z-transforms:
   (i) $y(n+2)-3y(n+1)+2y(n)=2^n$ given that $y(0)=y(1)=0$.
   (ii) $y_{k+2}+2y_{k+1}+y_k=k$ given that $y_0=y_1=0$.
   (iii) $y(n+2)-3y(n+1)-10y(n)=0$ given that $y(0)=1, y(1)=0$.
   (iv) $y_{n+2}+y_n=1$ given that $y_0=y_1=0$.
   (v) $x_n+3x_{n-1}-4x_{n-2}=0, n\geq 2$ given that $x_0=3, x_1=-2$.