

EE424 Homework 8

1) Determine the z-transform, including the region of convergence, for each of the following sequences:

- (a)  $x[n] = \left(\frac{1}{4}\right)^n u[n]$
- (b)  $x[n] = -\left(\frac{1}{4}\right)^n u[-n-1]$
- (c)  $x[n] = \left(-\frac{1}{4}\right)^n u[n]$
- (d)  $x[n] = \left(-\frac{1}{4}\right)^n u[-n-1]$
- (e)  $x[n] = \left(\frac{1}{4}\right)^{-n} u[-n]$
- (f)  $x[n] = 2\delta[n-2] + \delta[n-1]$

2) Determine the inverse z-transform for each of the following functions:

- (a)  $X(z) = \frac{1}{1 - \frac{1}{2}z^{-1}}, \quad |z| < \frac{1}{2}$
- (b)  $X(z) = \frac{1}{1 + \frac{1}{2}z^{-1}}, \quad |z| > \frac{1}{2}$
- (c)  $X(z) = \frac{1 + \frac{1}{2}z^{-1}}{1 - \frac{1}{4}z^{-2}}, \quad |z| > \frac{1}{2}$
- (d)  $X(z) = \frac{1 + z^{-1}}{\left(1 - \frac{1}{2}z^{-1}\right)\left(1 - \frac{1}{3}z^{-1}\right)}, \quad |z| > \frac{1}{2}$
- (e)  $X(z) = \frac{1 + z^{-1}}{\left(1 - \frac{1}{2}z^{-1}\right)\left(1 - \frac{1}{3}z^{-1}\right)}, \quad |z| < \frac{1}{3}$
- (f)  $X(z) = \frac{1 + z^{-1}}{\left(1 - \frac{1}{2}z^{-1}\right)\left(1 - \frac{1}{3}z^{-1}\right)}, \quad \frac{1}{3} < |z| < \frac{1}{2}$
- (g)  $X(z) = \frac{z^{-1}}{1 - \frac{3}{4}z^{-1} + \frac{1}{8}z^{-2}}, \quad |z| > \frac{1}{2}$