EECS 361
Homework #13

1. Section 6.6 Participation Activities
6.6.1: z-transform definition.
6.6.2: z-transform of a finite duration sequence.
6.6.4: Visualizing the z-transform.
6.6.6: z -transform of sinusoids.
6.6.7: z-transforms of some sinusoids.
6.6.8: z-transform pairs.

2. Find the z-transforms for the following signals

a. $0.5^n\, u[n]$
b. $(-0.5)^n\, u[n]$
c. $\cos(0.8\, n)\, u[n]$
d. $0.5^n \cos(0.8\, n)\, u[n]$
e. $0.5^n(1+\cos(0.8n))u[n]$
f. u[n]-u[n-3]
g. δ[n]+.5δ[n-1]+.25δ[n-3]

3. Given x[n] ={$\underline{0}$, 2, 3, 4, 3, 2, 0}find X(z).

4. Given x[n] ={$\underline{0}$, 0, 0, 1, 1, 1, 0, 0, 0}find X(z).

5. For x[n] ={$\underline{0}$, 4, 6, 8, 6, 4, 0} find X(z) and expressed X(z) the in the form of a ratio of two polynomials.

6. Section 6.7 Participation Activities
6.7.2: Convolution property of the z-transform
6.7.3: z-transform properties.
6.7.4: z-transform properties-part 2

7. Section 6.7 Challenge Activity
6.7.1: Properties of the z-transform (1)

8. Section 6.8 Participation Activities
6.8.1: Inverse z-transforms.

9. Exercise 6.8.1 a & b

10. Find x[n] given $X(z) = \frac{2z}{z-0.25} - \frac{z}{z+0.5} + \frac{0.5z}{z-0.1}$ and plot x[n] for n=0...6

11. Find x[n] given $X(z) = \frac{z\sin(\Omega)}{z^2 - 2z\cos(\Omega)+1}$ for $\Omega = \frac{\pi}{4}$ and plot x[n] for n=0...20.

12. Section 6.9 Participation Activities
6.9.1: Difference equation, block diagram, transfer function, and impulse response.
6.9.2: Discrete LTI system transfer function, impulse response, and difference equation.
6.9.3: Deriving the transfer function from a difference equation.

13. Given a transfer function $H(z)=0.5z^{-1}+2z^{-3}+6z^{-5}$ find the impulse response.

14. Given these difference equations find the corresponding transfer functions H(z) put H(z) in the form with all positive exponents of z, e.g., z^{+k}.

a. $y[n] = \frac{1}{3}x[n]+\frac{1}{3}x[n-1]+\frac{1}{3}x[n-2]$
b. y[n]=0.5y[n-1]+x[n]+2x[n-1]
c. y[n]=x[n]+1.27y[n-1]+.81y[n-2]

15. Given a difference equation y[n]=x[n]+2bcos(ϕ)y[n-1]+b^2y[n-2] .

a. Find transfer function H(z), put H(z) in the form with all positive exponents of z, e.g., z^{+k}.

b. Set b=0.9 and $\phi = \frac{\pi}{4}$ and compare to the result to H(z) found in part c. of problem 14; are the results the same?