ECE 2050 Autumn 2023 Homework 6
Due 5:00 pm, **Wednesday** Oct 11, 2023
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BC:6.1 For the following signals, **use the definition** to calculate the z-transform and find the *region of convergence* for each signal below. Does it matter whether you use the 1-sided or 2-sided definition for these signals? If this matters, calculate it using each definition. If it does not matter, briefly justify why it does not.

a.) $x_a[n] = (3j)^{-n}\,(u[n+3] - u[n-2])$

b.) $x_b[n] = (-0.9)^{-\frac{n}{2}} u[n+1]$

c.) $x_c[n] = (0.5)^n\,(\delta[n] + \delta[n-3] + \delta[n-11])$

d.) $x_d[n] = (-0.8)^n \cos(0.5\pi n) u[n-2]$
(Hint: Use the Euler identity to represent the cosine.)

BC:6.2 Use the z-transform tables of one-sided z-transform tranform pairs and properties to determine the (causal) sampled time function for each of the following z-domain functions. Assume a Region of Convergence of $|z| > 1$ is sufficient for the one-sided z-transform.

a.)
$$\hat{F}(z) = \frac{5z^2 - 13z + 17}{z^5}$$

b.)
$$\hat{H}(z) = \frac{-125z^{-2}}{z^2 + 0.5z} + \frac{23z^2}{z^3 - 0.15z^2}$$

c.)
$$\hat{X}(z) = \frac{13z^6 - 7z^4 + 3}{z^7 + 0.8z^6}$$

d.)
$$\hat{G}(z) = \left(\frac{3}{8}\right)\frac{z^{-1}e^{-j0.35\pi}}{ze^{-j0.35\pi} - 1} + \left(\frac{3}{8}\right)\frac{z^{-1}e^{j0.35\pi}}{ze^{j0.35\pi} - 1}$$

e.)
$$\hat{Y}(z) = \frac{15/j}{z + 0.25\sqrt{2} - j0.25\sqrt{2}} - \frac{15/j}{z + 0.25\sqrt{2} + j0.25\sqrt{2}} - \frac{4}{z-1} + \frac{5}{z - 0.16}$$