The following questions are from Lathi’s book, Second Edition.
Read Chapters 3.5-3.8, 5.1-5.5
You should turn in your solutions to all of the problems.

1. [16] For the following systems with the given impulse responses, find the zero-state output for the given input signal:
   a) \( x[n] = (2^n) u[n-1], h[n] = 2^n u[2-n] \)
   b) \( x[n] = u[n], h[n] = \delta[n] - 2\delta[n-1] \)
   c) Consider \( x[n] \) and \( g[n] \) in Figure P3.8-21 (a).
   d) \( x[n] = e^{-n} u[n+1], h[n] = (-2)^n u[n-1] \)

2. [10] 3.10-5

3. [16] Find the z-transform of the following signals and specify the region of convergences. Indicate whether or not the discrete-time Fourier transform of the sequence exists. You can use the z-transform properties to simplify your calculations:
   a) \( x[n] = 3[u[n] - u[n-5]] \)
   b) \( x[n] = 2^n u[n-1] + e^{n-1} u[n] \)
   c) \( x[n] = n 2^n u[n-1] \)
   d) \( 2^{-n} \cos\left(\frac{\pi}{3} n\right) u[n-1] \)

4. [12] 5.1-5 a, g, k

5. [12] 5.2-9 c, e, i

6. [12] 5.3-6

7. [12] 5.3-18

8. [10] 5.5-5 (a) sketch the magnitude and phase responses and determine the type of filter.