ECE-320,  
Quiz #7

For all of the following problems, assume we are using a two-sided z-transform.

1) The z-transform of a sequence \( x(n) \) is defined as

a) \( X(z) = \sum_{k=-\infty}^{\infty} x(k)z^k \)  
b) \( X(z) = \sum_{k=-\infty}^{\infty} x(k)z^{-k} \)

2) The z-transform of the sequence \( x(n) = 3^n u(n) \) is

a) \( \frac{z}{3-z} \)  
b) \( \frac{1}{z-3} \)  
c) \( \frac{1}{3-z} \)  
d) \( \frac{z}{z-3} \)  
e) none of these

3) The z-transform of \( x(n) = u(n) \) is

a) \( \frac{z}{z-1} \)  
b) \( \frac{1}{z-1} \)  
c) \( \frac{1}{1-z} \)  
d) \( \frac{z}{1-z} \)  
e) none of these

4) The z-transform of \( x(n) = u(n-1) \) is

a) \( \frac{z}{z-1} \)  
b) \( \frac{1}{z-1} \)  
c) \( \frac{1}{1-z} \)  
d) \( \frac{z}{1-z} \)  
e) none of these

5) The z-transform of the sequence \( x(n) = \delta(n) \) is

a) \( 1 \)  
b) \( z \)  
c) \( z^{-1} \)  
d) \( 0 \)  
e) none of these

6) The z-transform of the sequence \( x(n) = \delta(n-1) \) is

a) \( 1 \)  
b) \( z \)  
c) \( z^{-1} \)  
d) \( 0 \)  
e) none of these

7) The z-transform of the sequence \( x(n) = 3^{n+1} u(n) \) is

a) \( \frac{3z}{z-3} \)  
b) \( \frac{1}{3} \frac{z}{z-3} \)  
c) \( \frac{1}{3} \frac{z^2}{z-3} \)  
d) \( \frac{3z^2}{z-3} \)  
e) none of these
8) The z-transform of the sequence \( x(n) = 3^n u(n-1) \) is
   a) \( \frac{3}{z-3} \)  b) \( \frac{3z}{z-3} \)  c) \( \frac{9z}{z-3} \)  d) \( \frac{9}{z-3} \)  e) none of these

9) The z-transform of the sequence \( x(n) = 3^n u(n+1) \) is
   a) \( \frac{3z^2}{z-3} \)  b) \( \frac{1}{3} \frac{z}{z-3} \)  c) \( \frac{1}{9} \frac{z^2}{z-3} \)  d) \( \frac{1}{3} \frac{z^2}{z-3} \)  e) none of these

10) The z-transform of the sequence \( x(n) = 2^n u(n) \) converges provided
    a) \( 2 < |z| \)  b) \( |z| < 2 \)

11) The z-transform of the sequence \( x(n) = \left(\frac{1}{3}\right)^n u(n-1) \) converges provided
    a) \( \frac{1}{3} < |z| \)  b) \( |z| < \frac{1}{3} \)

12) For z-transform \( Y(z) = \frac{z^{-1}}{z-2} \), the inverse z-transform is
    a) \( y(n) = 2^n u(n) \)  b) \( y(n) = 2^{n-2} u(n-2) \)  c) \( y(n) = 2^{n+2} u(n+2) \)  d) \( y(n) = 2^{n-2} u(n) \)  e) none of these

13) For z-transform \( Y(z) = \frac{1}{z-2} \), the inverse z-transform is
    a) \( y(n) = \frac{1}{2} \delta(n) - \frac{1}{2} 2^n u(n) \)  b) \( y(n) = -\frac{1}{2} \delta(n) + \frac{1}{2} 2^n u(n) \)

14) Which of the following transfer functions represents an (asymptotically) unstable systems? (circle all of them)
    a) \( G(z) = \frac{z}{z+0.8} \)  b) \( G(z) = \frac{z}{z-0.8} \)  c) \( G(z) = \frac{z}{z+1.2} \)  d) \( G(z) = \frac{z}{z-1.2} \)

15) Which of the following systems will have a smaller settling time?
    a) \( G(z) = \frac{z}{z-0.9} \)  b) \( G(z) = \frac{z}{z-0.7} \)  c) \( G(z) = \frac{z}{z+0.5} \)  d) \( G(z) = \frac{z}{z+0.1} \)