

**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) $G(z) = \frac{z}{z+0.1}$