

ECE-320, Practice Quiz #6

For your ease, assume the form of convolution $y(n) = \sum_{k=-\infty}^{\infty} x(k)h(n-k)$ in all of the following problems.

1) The finite summation $S_N = \sum_{k=0}^N a^k$ is equal to

- a) $\frac{1-a^N}{1-a}$ b) $\frac{1-a^{N-1}}{1-a}$ c) $\frac{1-a^{N+1}}{1-a}$ d) $\frac{1+a^{N+1}}{1-a}$ e) none of these

2) The finite summation $S = \sum_{k=2}^{N-3} a^k$ is equal to

- a) $\frac{1-a^{N-4}}{1-a}$ b) $a^2 \frac{1-a^{N-4}}{1-a}$ c) $a^2 \frac{1-a^{N+4}}{1-a}$ d) $a^2 \frac{1-a^{N-1}}{1-a}$ e) none of these

3) If an LTI system with impulse response $h(n) = 3\delta(n-1)$ has input $x(n) = 2^n u(n-1)$, the output of the system is

- a) $y(n) = 3 \times 2^{n-1} u(n-2)$ b) $y(n) = 3 \times 2^n u(n-1)$ c) $y(n) = 3 \times 2^n u(n-2)$ d) none of these

4) If an LTI system with impulse response $h(n) = 3^n u(n)$ has input $x(n) = 2^n u(n)$, the output of the system is

- a) $y(n) = 3^n 2^n u(n)$ b) $y(n) = 3^n \frac{1 - \left(\frac{2}{3}\right)^{n+1}}{1 - \frac{2}{3}} u(n)$ c) $y(n) = 2^n \frac{1 - \left(\frac{3}{2}\right)^{n+1}}{1 - \frac{3}{2}} u(n)$

- d) $y(n) = \left[\frac{1 - \left(\frac{1}{2}\right)^{n+1}}{1 - \frac{1}{2}} \right] \left[\frac{1 - \left(\frac{1}{3}\right)^{n+1}}{1 - \frac{1}{3}} \right] u(n)$ e) none of these

5) If an LTI system with impulse $h(n) = 3^{n-2}u(n-2)$ has input $x(n) = 2^{n-1}u(n-1)$, the output of the system is

- a) $y(n) = 3^{n-3} \frac{1 - \left(\frac{2}{3}\right)^{n-1}}{1 - \frac{2}{3}} u(n-3)$ b) $y(n) = 3^{n-2} \frac{1 - \left(\frac{2}{3}\right)^{n-1}}{1 - \frac{2}{3}} u(n-3)$
 c) $y(n) = 3^{n-2} \frac{1 - \left(\frac{2}{3}\right)^{n-1}}{1 - \frac{2}{3}} u(n-3)$ d) none of these

6) If an LTI system with impulse response $h(n) = 3^{n+2}u(n+2)$ has input $x(n) = 2^n u(n)$, the output of the system is

- a) $y(n) = 3^{n+2} \frac{1 - \left(\frac{2}{3}\right)^{n+3}}{1 - \frac{2}{3}} u(n+2)$ b) $y(n) = 3^{n+2} \frac{1 - \left(\frac{2}{3}\right)^{n+2}}{1 - \frac{2}{3}} u(n+2)$
 c) $y(n) = 3^{n+2} \frac{1 - \left(\frac{2}{3}\right)^{n+1}}{1 - \frac{2}{3}} u(n+2)$ d) none of these

7) The sum $S = \sum_{k=0}^{\infty} a^k$ will converge provided

- a) $|a| > 1$ b) $|a| < 1$

8) If the sum $S = \sum_{k=0}^{\infty} a^k$ converges, it is equal to

- a) $\frac{1}{1+a}$ b) $\frac{1}{1-a}$ c) $\frac{a}{1-a}$ d) $\frac{a}{1+a}$

Answers: 1-c, 2-b, 3-a, 4-b, 5-d, 6-a, 7-b, 8-b