Signals and Systems Quiz #3

Name: _____   ID No.: _____   93/11/01

1. (10%) Please fill the formulas of the convolution sum and convolution integral.
   $y[n] = x[n] * h[n] =$ _____ , $y(t) = x(t) * h(t) =$ _____ .

2. (10%) Given a system with impulse response $h(t)$ and its inverse system, with impulse response $h_1(t)$, which must satisfy the condition $h(t) * h_1(t) =$ _____ .

3. (10%) The discrete-time formula $x[n] * (h_1[n] * h_2[n]) = (x[n] * h_1[n]) * h_2[n]$ represents the _____ property of LTI systems. On the other hand, the formula $x[n] * (h_1[n] + h_2[n]) = x[n] * h_1[n] + x[n] * h_2[n]$ represents the _____ property.

4. (40%) Please determine the discrete signal $y[n]$ as the convolution of the two signals:
   $x[n] = \begin{cases} 1, & 0 \le n \le 3 \\ 0, & \text{otherwise,} \end{cases}$ and $h[n] = \begin{cases} \alpha^n, & 0 \le n \le 5 \\ 0, & \text{otherwise.} \end{cases}$

5. (40%) Please determine the signal $y(t)$ as the convolution of the following two signals: $x(t) = e^{3t}u(-t)$ and $h(t) = u(t - 2)$.