

Tutorial Quiz #2 (DECIMATION/INTERPOLATION)

We will use $*$ to indicate the sample at time zero.

(a) Determine $x[3n]$, $x[\frac{n}{2}]$ and $x[2n-1]$ for
 $x[n] = \{2, -1, 1, 3, 2, 2, 4, -1\}$ (Assume zero-interpolation)

(b) Determine $x[\frac{n}{2}]$ for $x[n] = \{-1, 0, 1, 2, 3\}$
 using linear interpolation, $h[n] = \{0.5, 1, 0.5\}$.

(c) Determine $x[n-\frac{1}{3}]$ for $x[n]$ as in (b) and
 using linear interpolation, $h[n] = \{\frac{1}{3}, \frac{2}{3}, 1, \frac{2}{3}, \frac{1}{3}\}$.

Answers (a) $x[3n] = \{2, 3, 4\}$
 $x[\frac{n}{2}] = \{2, 0, -1, 0, 1, 0, 3, 0, 2, 0, 2, 0, 4, 0, -1\}$
 $x[2n-1] = \{2, 1, 2, 4\}$

(b) $x[\frac{n}{2}] = \{-1, -0.5, 0, 0.5, 1, 1.5, 2, 2.5, 3\}$

(c) $x[\frac{n}{3}] = \{-1, -\frac{2}{3}, -\frac{1}{3}, 0, \frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3}, \frac{5}{3}, 2, \frac{7}{3}, \frac{8}{3}, 3\}$

$x[\frac{n-1}{3}] = \{-1, -\frac{2}{3}, -\frac{1}{3}, 0, \frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3}, \frac{5}{3}, 2, \frac{7}{3}, \frac{8}{3}, 3\}$

$x[n-\frac{1}{3}] = \{-\frac{2}{3}, \frac{1}{3}, \frac{4}{3}, \frac{7}{3}\}$