summary

$$x[n] \longrightarrow \boxed{\downarrow N} \longrightarrow y[n]$$

$$\begin{array}{c|c} x[n] & & & w[n] \\ X(f) & & & w[n] \\ \hline \end{array} \quad \begin{array}{c} w[n] & & y[m] \\ \text{to sequence} & & Y(f') \\ \end{array}$$

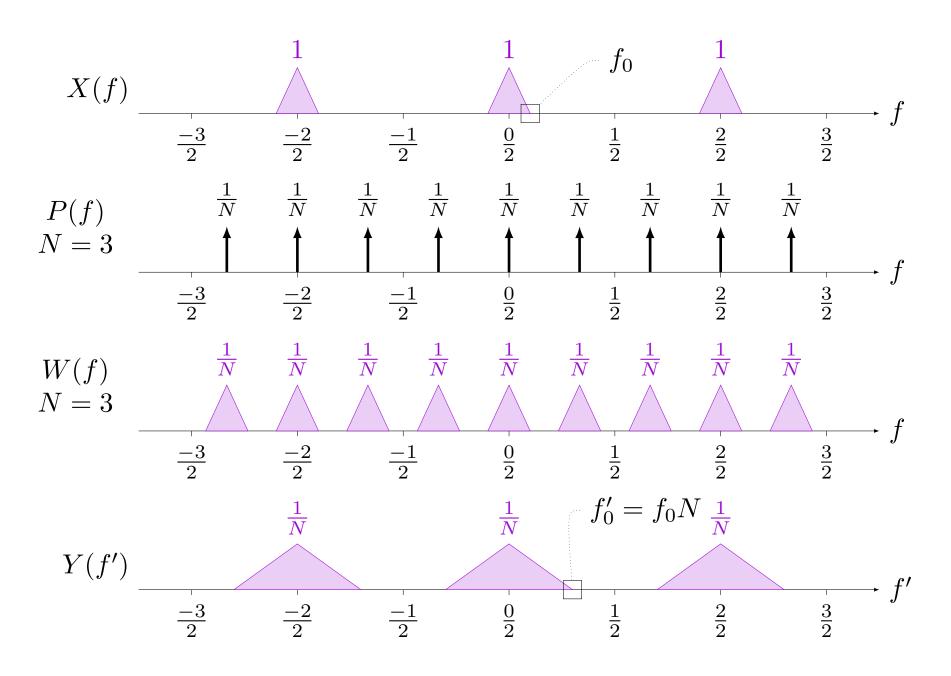
$$p[n] = \sum_{m=-\infty}^{\infty} \delta[n - mN] \quad \leftrightarrow \quad P(f) = \frac{1}{N} \sum_{m=0}^{N-1} \sum_{k=-\infty}^{\infty} \delta\left(f - \frac{m}{N} - k\right)$$

aliasing formula:
$$W(f) = \frac{1}{N} \sum_{k=0}^{N-1} X\left(f - \frac{k}{N}\right)$$

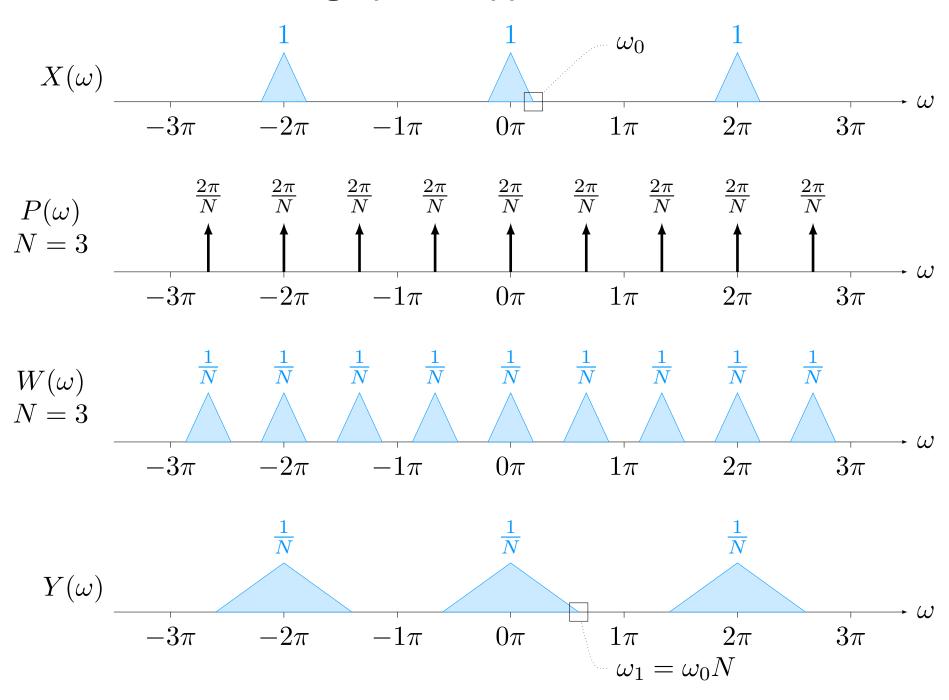
down sampling formula:
$$Y(f') = \frac{1}{N} \sum_{k=0}^{N-1} X\left(\frac{f'-k}{N}\right)$$

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graphical approach



graphical approach



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