ee101_network_3.sqproj

R = 1k

2R = $((R)*(2))
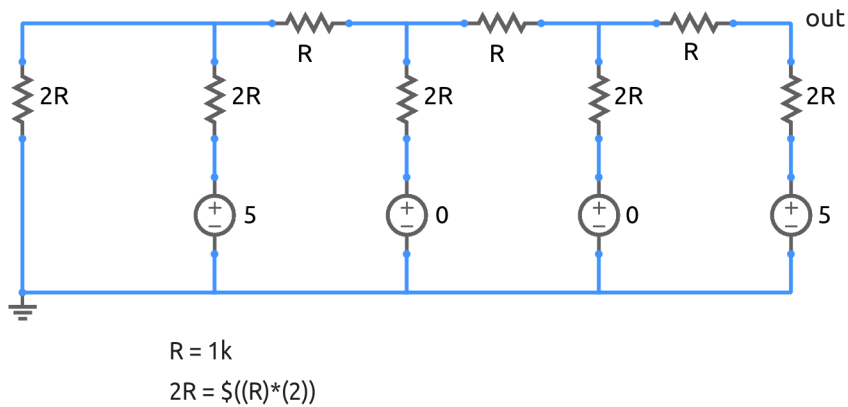
The circuit shown in the figure is the well-known "R-$2R$ ladder" used in some of the digital-to-analog converters (DACs). Each source voltage is either $5\,\text{V}$ or $0\,\text{V}$.

Exercise Set

1. Find an expression for the output voltage in terms of the four source voltages (call them V_{S0}, V_{S1}, V_{S2}, V_{S3} from left to right) using superposition. (Hint: Thevenin's theorem is convenient in this exercise.)

2. Verify your results with simulation for a few specific cases such as that shown in the figure.