Problems 4, 5, and 6 Solutions by Roger Su

4. From Lecture 2,
Mux using transmission gates

\[
\begin{array}{c}
\text{out} \\
\text{Pick}x \\
\hline
\text{Pick}x \\
\hline
\end{array}
\]

4 transistors total

Mux using NAND, NOR, or INV

Each NAND2 gate has 4 transistors

\[
\begin{array}{c}
\text{out} \\
\text{Pick}x \\
\hline
\text{Pick}x \\
\hline
\end{array}
\]

3 \times 4 = 12 transistors total

Your design uses more transistors than a mux built with transmission gates.
5. Transmission gate mux stick diagram
(In the textbook's style)

Key
- Metal
- Contact
- Diffusion
- Polysilicon
6. Gate-level schematic of majority gate

10-input NAND decomposed into 5 smaller gates