Drawing the Hypercube

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July 2012
ICME, Seoul, Korea
Acknowledgement

This talk was supported by the Ministry of Education Science and Technology (MEST) and the Korean Federation of Science and Technology Societies (KOFST).
Outline

• A Cube
Outline

- A Cube
- Projections and Matrices
Outline

- A Cube
- Projections and Matrices
- Step-by-Step Hypercube
Outline

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- Step-by-Step Hypercube
- Pascal’s Triangle
Outline

• A Cube
• Projections and Matrices
• Step-by-Step Hypercube
• Pascal’s Triangle
• The Hypercube in Art
Captain Kangaroo
graph paper
Drawing a Cube
Drawing a Cube
Drawing a Cube
Drawing a Cube
Drawing a Cube
Drawing a Cube

\[ z \]
\[ y \]
\[ x \]
Drawing a Cube
Drawing a Cube
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Drawing a Cube
Drawing a Cube
Drawing a Cube
Projection Matrix

\[ P = \begin{bmatrix} -1 & 3 & 0 \\ -2 & 0 & 3 \end{bmatrix} \]
Projection Matrix

\[ P = \begin{bmatrix} -1 & 3 & 0 \\ -2 & 0 & 3 \end{bmatrix} \]

\[ \begin{bmatrix} -1 & 3 & 0 \\ -2 & 0 & 3 \end{bmatrix} \cdot \begin{bmatrix} 3/2 \\ 1/2 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \]
The Null Space
Drawing the Hypercube
Drawing the Hypercube
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1000
0100
0010
0001
1100 1110
1111
0011
0111
Drawing the Hypercube
Drawing the Hypercube
Drawing the Hypercube