Subtractive Color

John C. Hart
CS 418
Interactive Computer Graphics
CMY Subtractive Color

- Cyan, Magenta, Yellow
- Color model used in pigments and reflective materials (ink, paint)
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- Cyan, Magenta, Yellow
- Color model used in pigments and reflective materials (ink, paint)
- Grade school color rules
  - Blue + Yellow = Green? No.
  - Cyan + Yellow = Green
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  - Blue + Yellow = Green? No.
  - Cyan + Yellow = Green
- Also CMYK (blacK)
  - C + M + Y = Brown?
  - C + M + Y = Black (in theory)
  - C + M + Y = Gray (in practice)
  - C + M + Y wastes expensive color ink
RGB to CMY

\[
\begin{bmatrix}
  C \\
  M \\
  Y \\
  1
\end{bmatrix} =
\begin{bmatrix}
  -1 & 1 \\
  -1 & 1 \\
  -1 & 1 \\
  1 & 1
\end{bmatrix}
\begin{bmatrix}
  R \\
  G \\
  B \\
  1
\end{bmatrix}
\]
CMY to CMYK

\[
\begin{bmatrix}
C \\
M \\
Y \\
K
\end{bmatrix} =
\begin{bmatrix}
1 & -\min(C, M, Y) \\
1 & -\min(C, M, Y) \\
1 & -\min(C, M, Y) \\
\min(C, M, Y) & 1
\end{bmatrix}
\begin{bmatrix}
C \\
M \\
Y \\
1
\end{bmatrix}
\]