Hiding Data in Images

Steganography Part 1

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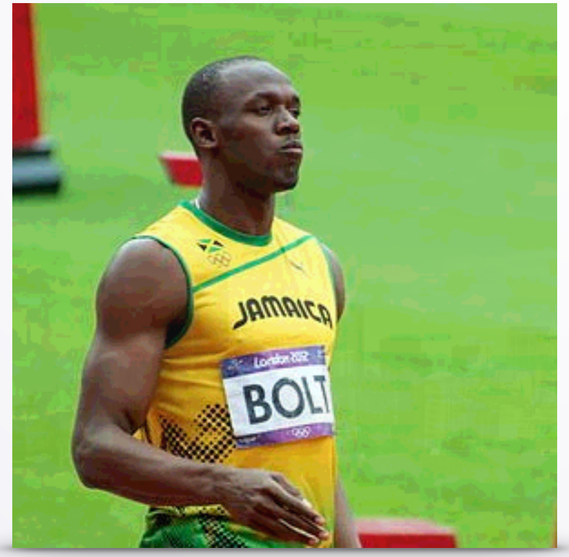
Steganography to Explore Coding

- Steganography is the hiding of data in an image or other digital artifact
  - Originally not digital, invisible ink, wax tablets
  - Hiding text requires more math than images



Usain Bold by Nick Webb/CC-by-2.0

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Coding Challenge for You

- You will be able to find hidden meaning in the universe!
  - You'll see code to hide one image in another
  - Challenge: write code to extract hidden image

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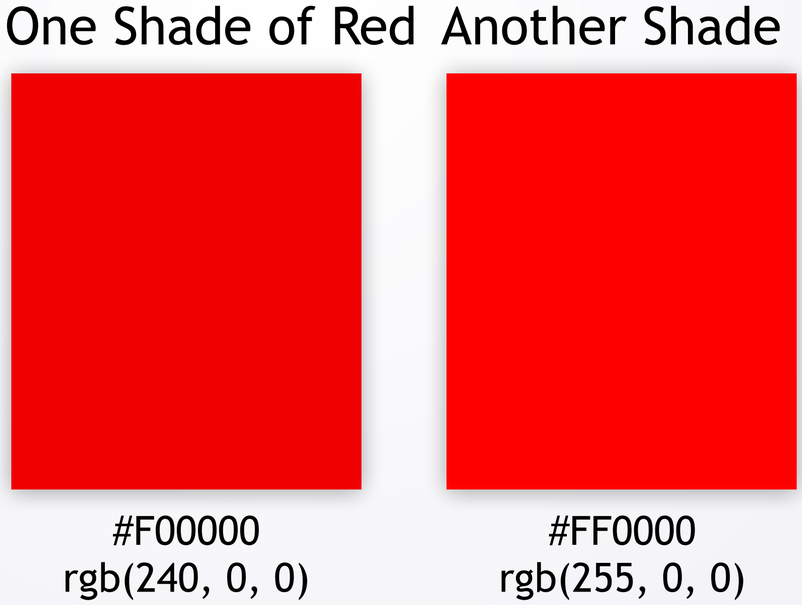
How to Hide Data in Pixels?

- Pixels have Red, Green, Blue components
  - Each is a value between 0-255

How to Hide Data in Pixels?

- Pixels have Red, Green, Blue components
  - Each is a value between 0-255
  - Is there a big difference between 240 and 255?
- Half a pixel for hiding
  - We'll do math!
  - Explain Decimal
    - Use binary/hex

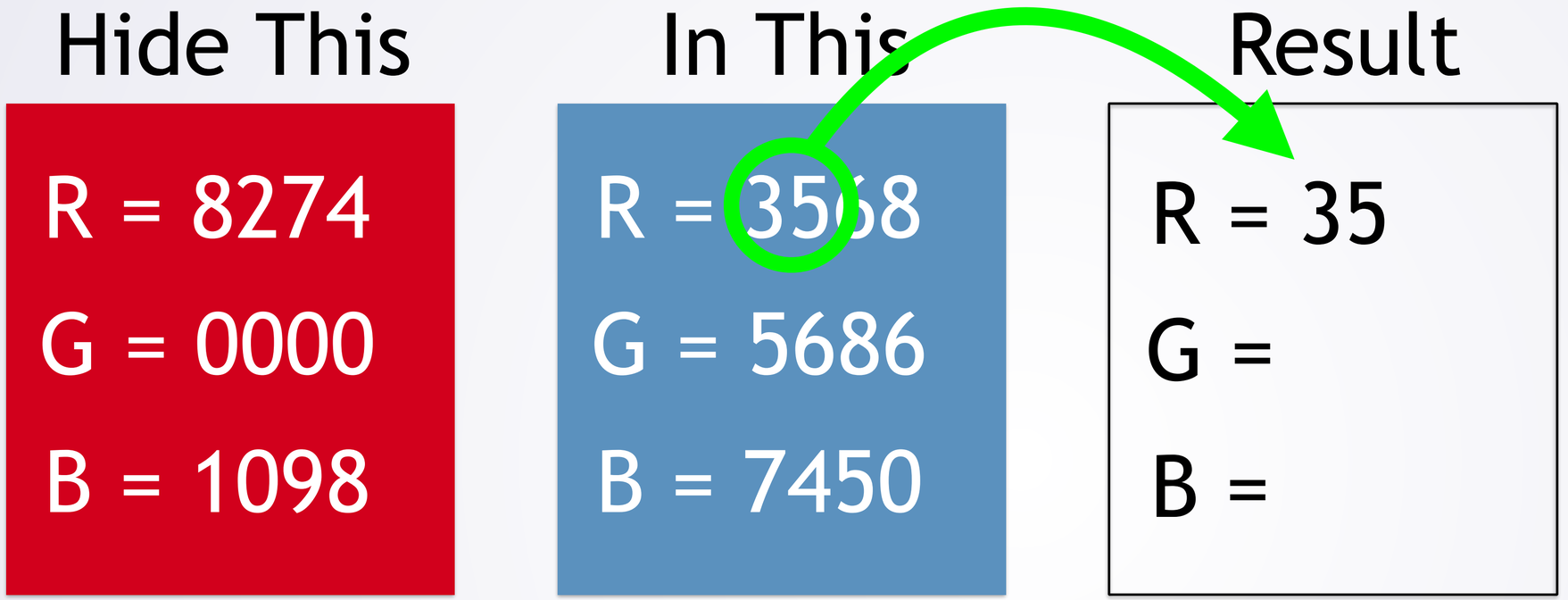


First Decimal

Hide This	In This
R = 8274	R = 3568
G = 0000	G = 5686
B = 1098	B = 7450

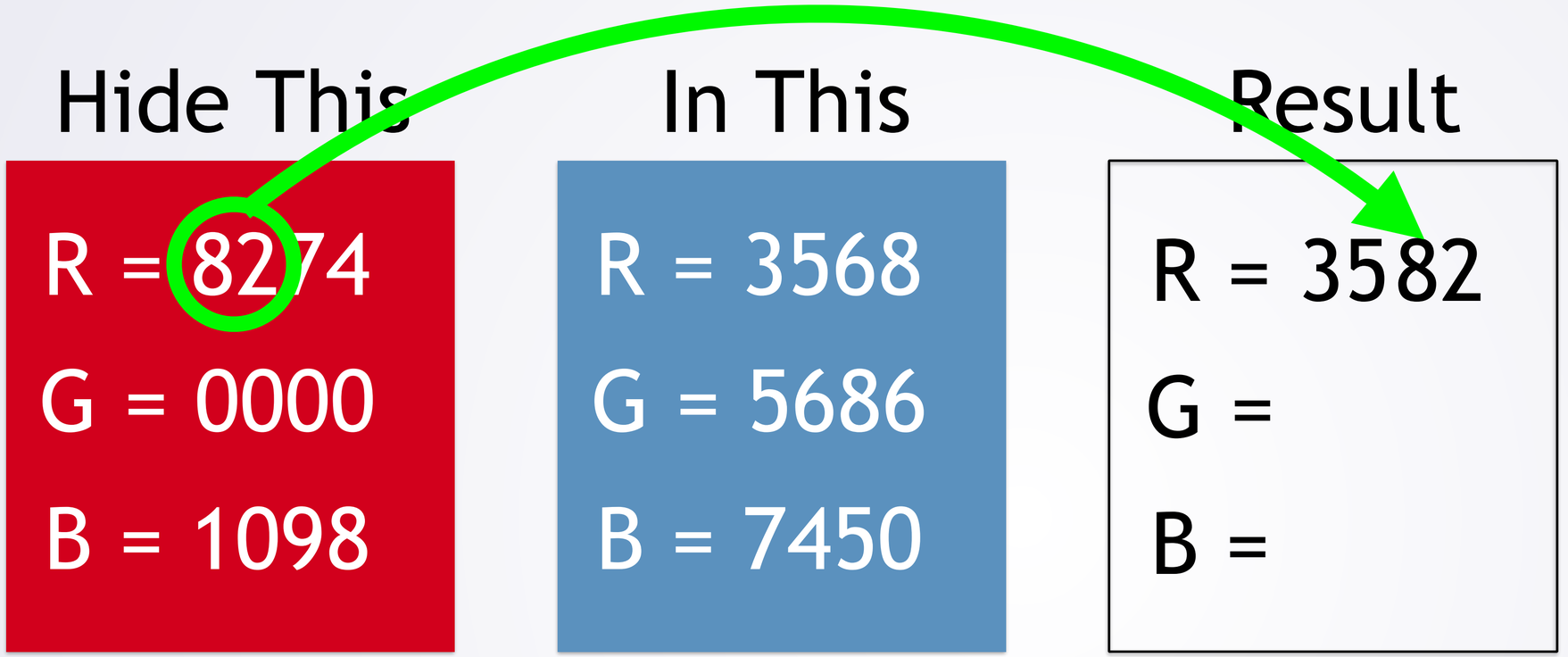
- Suppose colors went 0 to 9999
  - 4 decimal digits

First Decimal



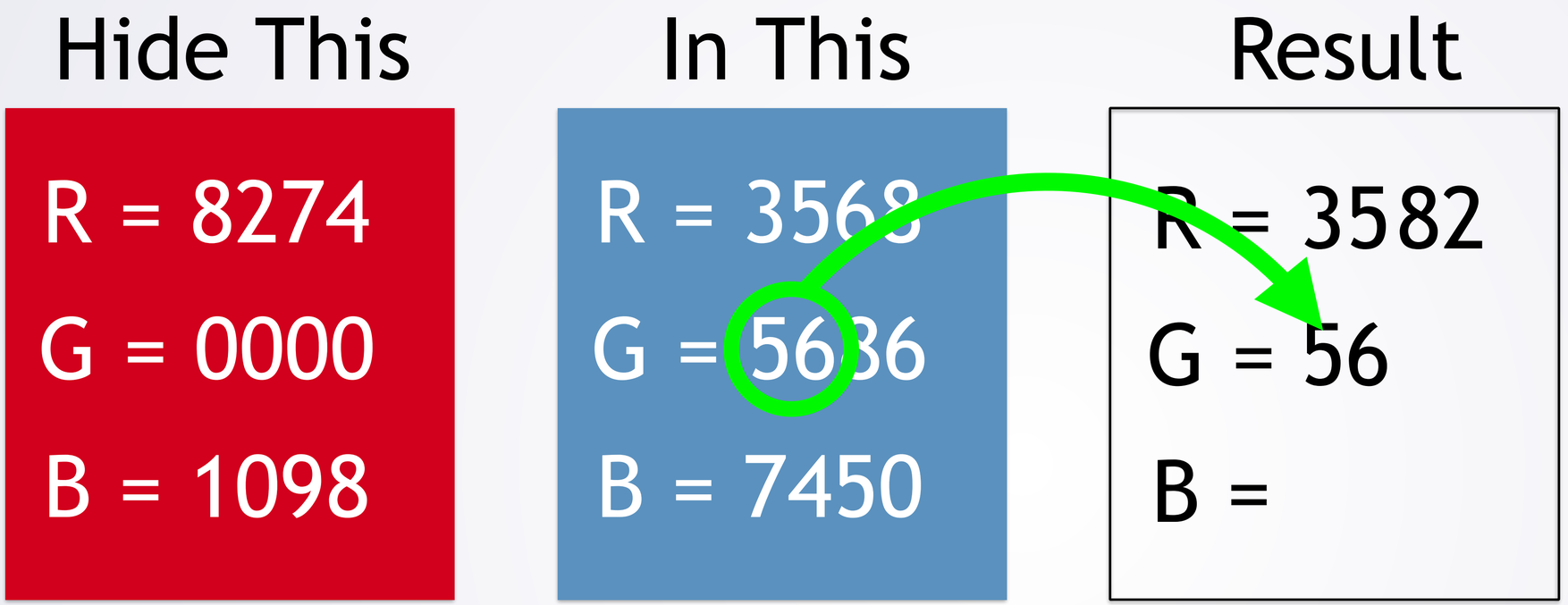
- Suppose colors went 0 to 9999
  - 4 decimal digits

First Decimal



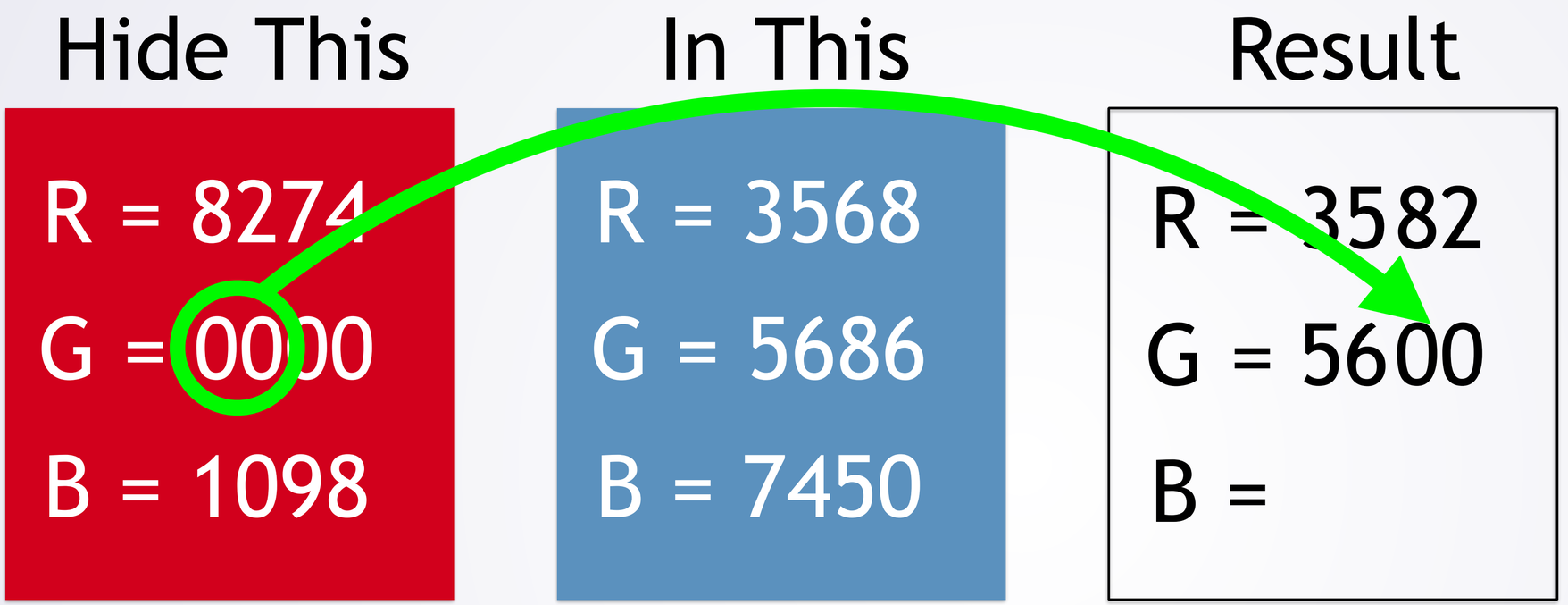
- Suppose colors went 0 to 9999
  - 4 decimal digits

First Decimal



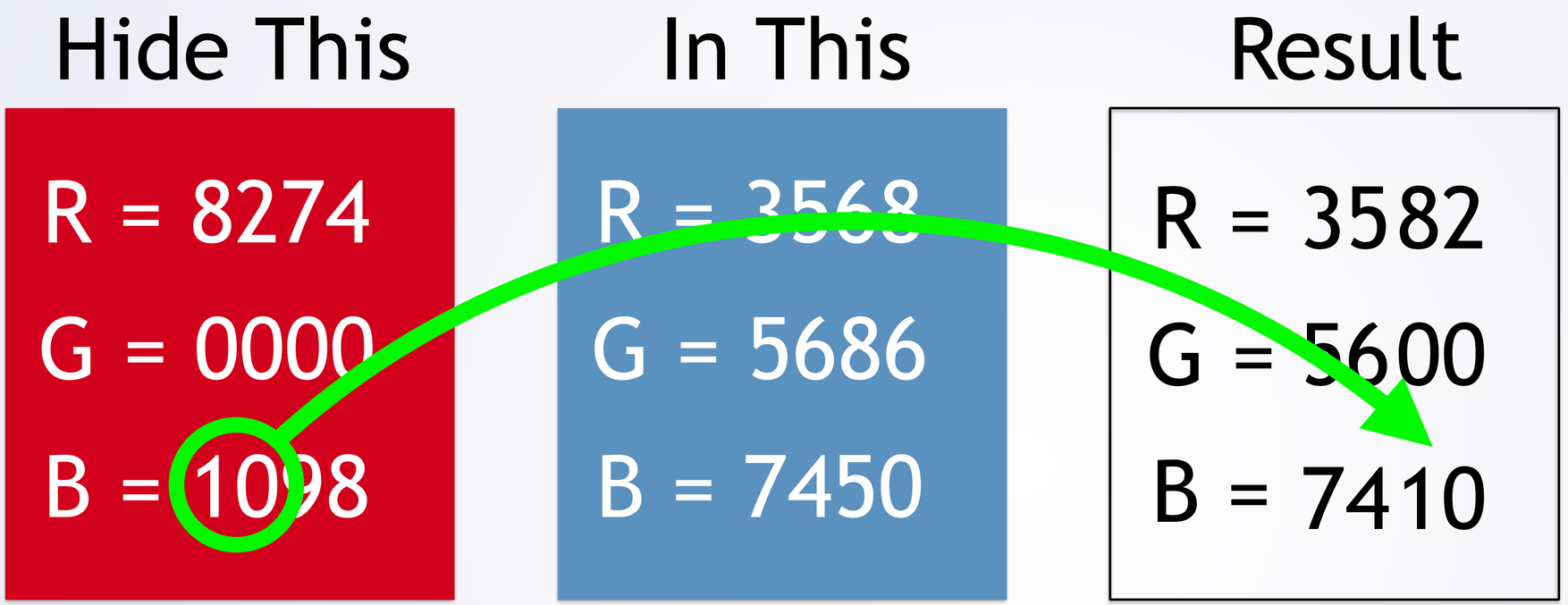
- Suppose colors went 0 to 9999
  - 4 decimal digits

First Decimal



- Suppose colors went 0 to 9999
  - 4 decimal digits

First Decimal



- Suppose colors went 0 to 9999
  - 4 decimal digits

First Decimal

Hide This	In This	Result
R = 8274	R = 3568	R = 3582
G = 0000	G = 5686	G = 5600
B = 1098	B = 7450	B = 7410

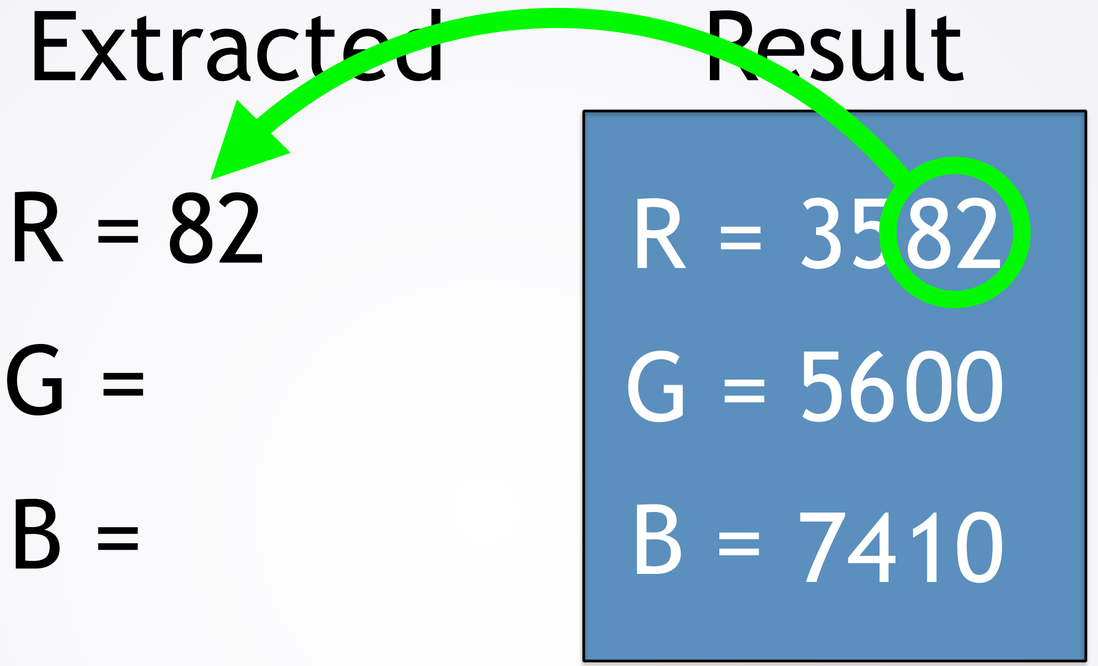
- Suppose colors went 0 to 9999
  - 4 decimal digits

First Decimal

Extracted	Result
R =	R = 3582
G =	G = 5600
B =	B = 7410

- Suppose colors went 0 to 9999
  - 4 decimal digits

First Decimal



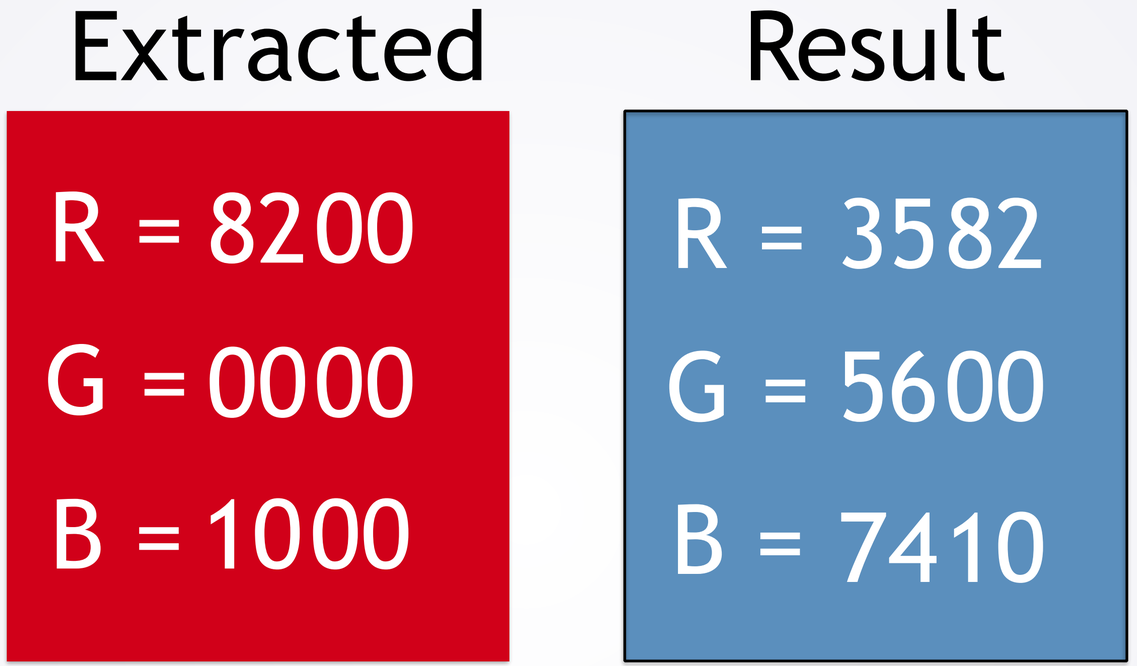
- Suppose colors went 0 to 9999
  - 4 decimal digits

First Decimal

Extracted	Result
R = 8200	R = 3582
G =	G = 5600
B =	B = 7410

- Suppose colors went 0 to 9999
  - 4 decimal digits

First Decimal



- Suppose colors went 0 to 9999
  - 4 decimal digits

First Decimal

Original	Extracted	Result
R = 8274	R = 8200	R = 3582
G = 0000	G = 0000	G = 5600
B = 1098	B = 1000	B = 7410

- Suppose colors went 0 to 9999
  - 4 decimal digits

Steganography High Level

- Big idea: Hide information in image
  - Your goal: one image in another
  - Minor numerical change: look same
- Need to do in **binary**, not decimal
  - 0 to 255, not 0 to 9999