- CPSC 275: Introduction to Computer Systems

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Fall 2025

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Solution to Homework 35

NOTE: A fast way to convert the fractional part of a decimal number (i.e., numbers between 0 and 1) into binary:

1. Take the decimal fraction and multiply it by 2.
2. Write down the digit to the left of the decimal point (either 0 or 1).
3. Use only the remaining fraction for the next step.
4. Repeat the process until the fraction becomes zero, or until you've collected enough binary digits.
5. Collect the integer parts in order.

Example: Convert 0.125 to binary:
$0.125 \times 2 = 0.25 \rightarrow$ whole number: 0
$0.25 \times 2 = 0.5 \rightarrow$ whole number: 0
$0.5 \times 2 = 1.0 \rightarrow$ whole number: 1 (Since the fractional part is now 0, we stop)
Collecting the integer parts in order: 0.125 = 0.001 in binary.

Example: Convert 0.2 to binary:
$0.2 \times 2 = 0.4 \rightarrow 0$
$0.4 \times 2 = 0.8 \rightarrow 0$
$0.8 \times 2 = 1.6 \rightarrow 1$
$0.6 \times 2 = 1.2 \rightarrow 1$
$0.2 \times 2 = 0.4 \rightarrow 0$
$0.4 \times 2 = 0.8 \rightarrow 0$
$0.8 \times 2 = 1.6 \rightarrow 1$
$0.6 \times 2 = 1.2 \rightarrow 1$
…
Thus, 0.2 is 0.0011 0011 0011… (binary), with 0011 repeating forever.

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1. A. `01001011`
   B. `00101001`
   C. `-3.5`

2. A. 116
   B. 116
   C. 116

D. 116
E. 1.625

3. A. -72
B. -183
C. 328
D. -184
E. -0.625

- **Welcome: Sean**
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