#### CS 261 Midterm 1

**Review Session** 

# Exam Format

- 50 minutes, 10% of final grade (same as a project!)
- Closed book, closed note
- 10 true/false questions
- ~2 pages of multiple-choice 5-option questions
- ~3 pages of short-answer free response
- NO extensive coding or long-form essays
- Scientific and graphing calculators allowed

# Review Strategies

- Review slides and notes (linked from calendar)
- Review quizzes (available on Canvas)
- Review labs and examples (available on stu)
- Write problems for yourself and your friends; check your work against each other
- Solve problems from the textbook (Ch.1 3.2)

Core Theme:

#### **Opening Black Boxes**

### General Issues

- Systems are collections of communicating components.
- Modern computers are comprised of a large number of large and diverse systems (both hardware and software).
- How do these systems work, and how do their internals impact external systems?

Core Theme:

#### Computer as Other

### General Issues

- How do we (as humans) interact at a low level with a digital machine?
- What kinds of tools facilitate this interaction?
- How do we use computers to solve problems?
- Computers are less flexible than we are; what must we do to accommodate this difference?

Core Theme:

#### Information = Bits + Context

## General Issues

- How do we represent non-binary information in a digital system?
- How do specific encodings work?
- How do we convert information to/from various encodings?
- Do the transformations preserve all data?

# Course Topics



#### What are you comfortable with?



#### What are you LEAST comfortable with?

# point

precision worksheet Safe float monday 2's 3sig difficulty Storage Important A structs specific depending concepts Numbers hardest much division to/from class grasping complement normalization/denormalization anything although scientific of floating completely covered conversion 

debugging representing binary/decimal need tracing Machine/Assembly going Normalized not arithmetic functions/commands Chapter CO **NEX** entirely topic Binary feel grasp big-endian feel tricky compliment far multiplication Program assembly also enew understandpointers Program Progra thmetic last Oreview thoroughly instructions sort Converting actually Floating-Point power conversions/compilation Floating-point least-endian CONTUSED twos command Values probably everything go Assemi material like love exponent formatting and A Binary language tested still finding Understanding Tes Unsafe sure converting floating-point Topic normality really involving them that thing negatives beginning types two line Point math typedefs Probably coding Perhaps

### Max Numbers

Value	Word size w			
	8	16	32	64
UMax <sub>w</sub>	0xFF	OxFFFF	OxFFFFFFFF	OxFFFFFFFFFFFFFFFFFFFF
	255	65,535	4,294,967,295	18,446,744,073,709,551,615
TMin <sub>w</sub>	0x80	0x8000	0x80000000	0x800000000000000000000000000000000000
	-128	-32,768	-2,147,483,648	-9,223,372,036,854,775,808
<i>TMax<sub>w</sub></i>	0x7F	0x7FFF	0x7FFFFFFF	0x7FFFFFFFFFFFFFFFFFF
	127	32,767	2,147,483,647	9,223,372,036,854,775,807
-1	OxFF	OxFFFF	OxFFFFFFFF	OxFFFFFFFFFFFFFFFFFFFF
0	0x00	0x0000	0x00000000	0x000000000000000000000000000000000000

Figure 2.14 Important numbers. Both numeric values and hexadecimal representations are shown.

# Denormal Example

- $0 \times 06 = 0$  0000 110
- $Exp = 1 bias = 1 (2^{4-1} 1) = 1 7 = -6$
- Sig = 6/8 = 0.75
- Value =  $0.75 \times 2^{-6} = 0.0117$