Summer 2017
Exam 1
06/20/2017

This exam contains 2 pages (including this cover page) and 5 questions.

Instructions

1. *Read every question very carefully.*
2. *You should be able to finish this exam in an hour.*
3. *For descriptive questions, please complete the answer in 5-10 sentences.*
4. *Please try to submit soft copies. If you are planning to submit scanned copies of hand-written answers, please make sure they are very clear.*
5. *Total points for the exam is 100.*

Grade Table (for teacher use only)

Question	Points	Score
1	20	
2	20	
3	20	
4	20	
5	20	
Total:	100	

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1. (20 points) Explain the von Neumann architecture with a clear diagram.

2. (20 points) Explain how the set associative cache scheme combine the advantages of direct mapped cache and fully associative cache.

3. (20 points) Perform the following operations.
   (a) (5 points) Convert 1234 to binary
   (b) (5 points) Convert 1011010_2 to decimal
   (c) (5 points) Convert 1010101010101010_2 to hexadecimal
   (d) (5 points) Convert 101101101101_2 to octal

4. (20 points) What are the DECIMAL values of the following registers in a MARIE computer after executing the selected line in the code given below.

```
Load    X
Add     Y
Store   Z /AFTER EXECUTING THIS LINE
Halt
X,      Dec     1
Y,      Dec     2
Z,      Hex     111
```

   (a) (5 points) AC
   (b) (5 points) IR
   (c) (5 points) PC
   (d) (5 points) MBR

5. (20 points) Describe some of the challenges in designing an ISA.