CS 151
Quiz 1

Name : __________________ , _________________
      (Last Name)                   (First Name)

Student ID : ________________

Signature : ________________

Instructions:

1. Please verify that your paper contains 7 pages including this cover.
2. Write down your Student-Id on the top of each page of this quiz.
3. This exam is closed book. No notes or other materials are permitted.
4. Total credits of this midterm are 50 points.
5. To receive credit you must show your work clearly.
6. No re-grades will be entertained if you use a pencil.
7. Calculators are NOT allowed.
Q1: [Data conversion] 10 points

a) Convert the following decimal number to binary number using divide-by-2 method: (5 points)

   112

b) Convert the following hexadecimal number to binary form: (5 points)

   ACF1
Q2: [Boolean algebra]  

10 points

a) Prove the following Boolean equation using boolean algebra: (5 points)

\[ x'y'z'w' + xy'zw' + xy'z'w' + x'y'zw' = y'w' \]

b) Use algebraic manipulation to convert the following equation to sum-of-product form: (5 points)

\[ (a + b)'(cd)' + a(b + e)'d + (bc)d' \]
Q3: [Combinational logic design] 10 points

There are three major courses X, Y and Z, and two minor courses A and B in a department. A student can graduate if he or she passes:

1- all the major courses from X to Z
or
2- two major courses and both minor courses

Write a Boolean equation to represent the graduation condition. Use the name of the courses as the variables of your equation.
Q4: [Muxer/Decoder Application] 20 points

For function \( F(x, y, z) = xy'z' + x'yz' + x'y'z \)

(a) Create the truth table (4 points)
(b) Implement $F$ by means of $8$-to-$1$ Multiplexer (8 points)
(c) Implement F by means of a 3-to-8 Decoder (8 points)