Midterm

CS 210
Winter 1994
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Name: ____________________________________

1 Convert the decimal number 53.025 to binary. Indicate which fractional binary digits repeat, if any.

2 Consider the 6-digit unsigned octal numbers $M = \texttt{461233}, \quad N = \texttt{527760}$. Compute $M - N$ in octal form using radix complement subtraction.

3 Consider the 8-bit signed 2's complement binary numbers $M = \texttt{01101001}, \quad N = \texttt{11110101}$.

a) Compute $M + N$ in signed 2's complement form using signed 2's complement arithmetic.

b) Compute $M - N$ in signed 2's complement form using signed 2's complement arithmetic.

4 Simplify the following Boolean expressions to a minimum number of literals using algebraic inference.

a) $x + x'y + y'z$

b) $x(x' + x'y')'$

c) $(x + y')(x' + y)$

5 Consider the Boolean expression $e = (xy + z)(xz + y)$.

a) Produce the Boolean expression equivalent to e in canonical sum of minterms form.

b) Produce the Boolean expression equivalent to e in canonical product of maxterms form.

6 Consider the Boolean expression $e = y'(w + z') + (z + wx)'$.

a) Give a Karnaugh map for e.

b) Give all products which are prime implicants of e.

c) Produce all Boolean expressions equivalent to e in minimum-literal sum of products form.

7 A 3-input odd parity circuit outputs 1 if an odd number of its three inputs is assigned 1; otherwise, it outputs 0.

a) Write a boolean expression e which is used to implement a 3-input odd parity circuit.

$$e =$$

b) Produce a minimum-literal standard form expression equivalent to e which can be used to implement a two-level NOR-NOR circuit for e.

c) Draw the two-level NOR-NOR circuit which implements e as expressed in b).