Digital Logic Project 1 Bookwork

Mason Doherty

Verilogians

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Using Excel and GNU Emacs

Truth Table:

J	K	L	M	¬J	¬K	¬L	¬M	¬J ▽ ¬K	¬L ▽ ¬M	¬K ▽ ¬L	¬J ▽ ¬M	¬J ▽ ¬L	(¬J ▽ ¬K) ▽ (¬L ▽ ¬M) ▽ (¬K ▽ ¬L) ▽ (¬J ▽ ¬M) ▽ (¬J ▽ ¬L)	¬((¬J ▽ ¬K) ▽ (¬L ▽ ¬M) ▽ (¬K ▽ ¬L) ▽ (¬J ▽ ¬M) ▽ (¬J ▽ ¬L))
0	0	0	0	1	1	1	1	0	0	0	0	0	1	0
0	0	0	1	1	1	1	0	0	0	0	0	0	1	0
0	0	1	0	1	1	0	1	0	0	0	0	0	1	0
0	0	1	1	1	1	0	0	0	1	0	0	0	0	1
0	1	0	0	1	0	1	1	0	0	0	0	0	1	0
0	1	0	1	1	0	1	0	0	0	0	0	0	1	0
0	1	1	0	1	0	0	1	0	0	1	0	0	0	1
0	1	1	1	1	0	0	0	0	1	1	0	0	0	1
1	0	0	0	0	1	1	1	0	0	0	0	0	1	0
1	0	0	1	0	1	1	0	0	0	0	1	0	0	1
1	0	1	0	0	1	0	1	0	0	0	0	1	0	1
1	0	1	1	0	1	0	0	0	1	0	1	1	0	1
1	1	0	0	0	0	1	1	1	0	0	0	0	0	1
1	1	0	1	0	0	1	0	1	0	0	1	0	0	1
1	1	1	0	0	0	0	1	1	0	1	0	1	0	1
1	1	1	1	0	0	0	0	1	1	1	1	1	0	1

Minterm Equation:

$$f = (J'K'LM) + (J'KLM') + (J'KLM) + (JK'L'M) + (JK'LM') + (JK'LM) + (JKL'M') + (JKL'M) + (JKLM') + (JKLM)$$

Sigma Notation:
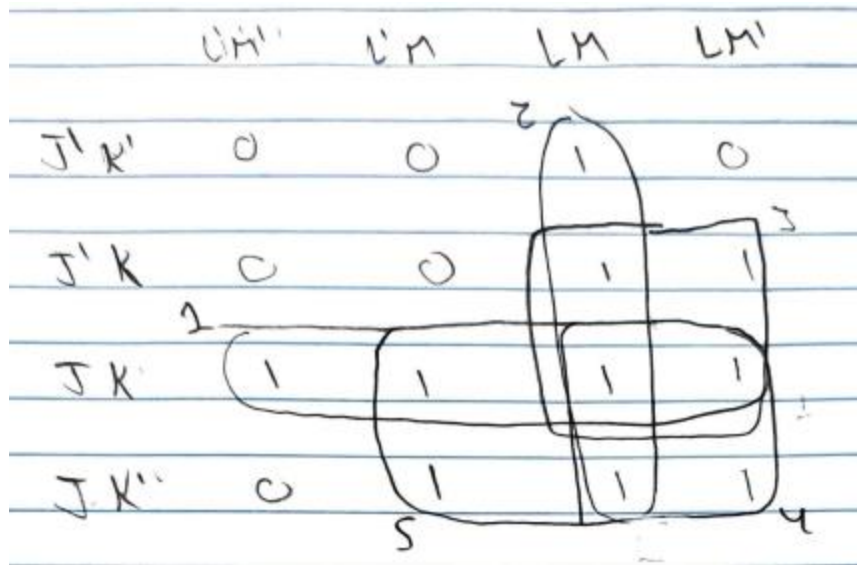
$$f = \Sigma(3,5,6,7,8,9,10,11,12,13,14,15)$$

Maxterm Equation:

$$f = (J + K + L + M)(J + K + L + M')(J + K + L' + M)(J + K' + L + M +)(J+K' + L+M')(J' + K + L + M)$$

Pi Notation:

$$f = \pi(0,1,2,4,5,8)$$

K-Map:

Normalized Equation:

$$f(1) = (J = 1, K = 1)$$
$$f(2) = (L = 1, M = 1)$$
$$f(3) = (L = 1, K = 1)$$
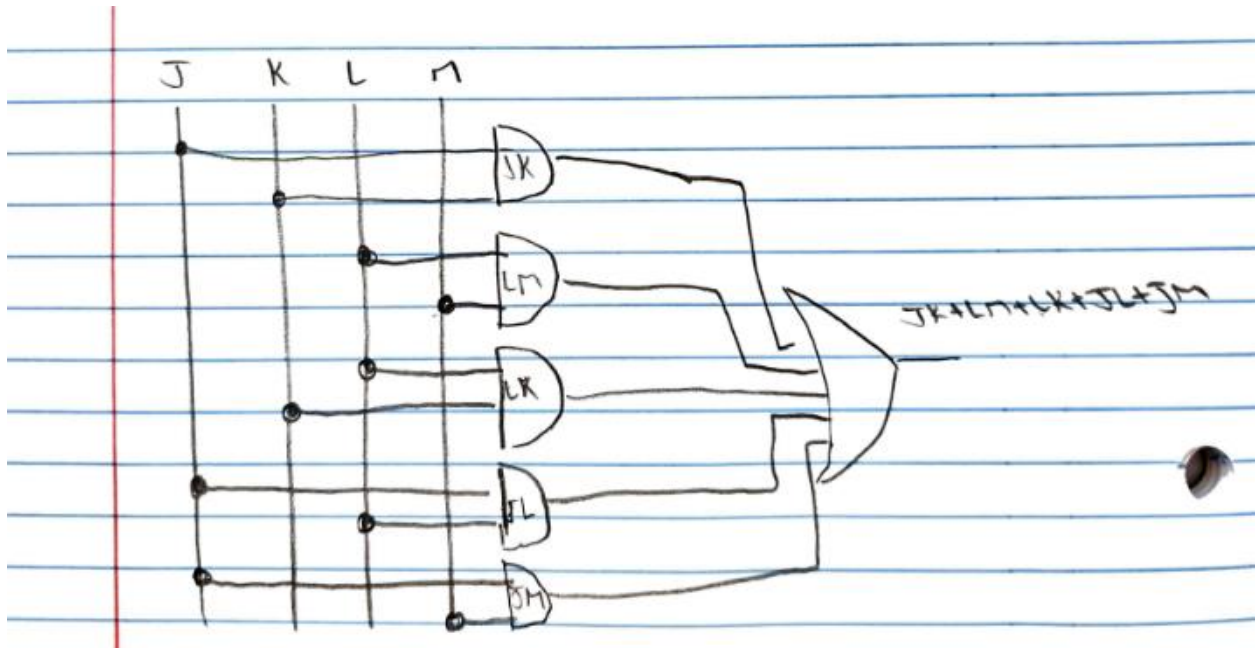$$f(4) = (L = 1, J = 1)$$
$$f(5) = (J = 1, M = 1)$$
$$f = JK + LM + LK + JL + JM$$

Normalized Truth Table:

J	K	L	M	JK	LM	LK	JL	JM	JK+LM+LK+JL+JM
0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0
0	0	1	1	0	1	0	0	0	1
0	1	0	0	0	0	0	0	0	0
0	1	0	1	0	0	0	0	0	0
0	1	1	0	0	0	1	0	0	1
0	1	1	1	0	1	1	0	0	1
1	0	0	0	0	0	0	0	0	0
1	0	0	1	0	0	0	0	1	1
1	0	1	0	0	0	0	1	0	1
1	0	1	1	0	1	0	1	1	1
1	1	0	0	1	0	0	0	0	1
1	1	0	1	1	0	0	0	1	1
1	1	1	0	1	0	1	1	0	1
1	1	1	1	1	1	1	1	1	1

Circuit for normalized equation:

J   K   L   M

JK

LM

LK

JL

JM

$$JK+LM+LK+JL+JM$$

NAND Circuit:

J   K   L   M

JK

LM

LK

JL

JM