Half-hour Examination #2 - 30 minutes
Closed Book, one 8.5x11" page of notes (double-sided)

NAME _____ Pilot ID: w_____ **SCORE** _____ / 20

Problem #1

Simplify the following equations to minimized SOP form. Use Boolean Algebra or a K-map to **show your work.** Partial credit may be awarded for correct but not-fully minimized equations. No credit will be awarded for simply coping down the original (correct) equation UNLESS the original equation is already minimized.

(a) [3 pts.] F = ab + a'b'd'

(b) [3 pts.] F = (XY + Z) (Y+XZ)

(c) [3 pts.] F = (A+B)'(A'+B')

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Problem #2

Car Detector Circuit: You will design a device with a 3-bit input F2, F1, F0 and a one-bit output C. Input F[2:0] comes from a Ferrous Metal Detector that sends a three-bit unsigned magnitude binary number that represents the amount of Ferrous Metal Detected above a sensor impended in a concrete slab. The goal of your device is to determine if enough Ferrous Metal is sensed to indicate that a car is present. The output of your device CarDetected (C) should be asserted if (and only if) the current value of the input F is five or greater.

(a) [3 pts.] Construct a Truth Table that realizes the solution to the design problem stated above

(b) [3 pts.] Construct minimized SOP equation(s) from your truth-table that fully describes the functionality of your solution.

(c) [3 pts.] Provide a logic diagram that implements your solution to the design problem.

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Problem #3

[1 pt.] Implement the function F = ((A'+B') + (BC+D))' using only NAND and NOR gates. In order to receive credit, your answer must be correct AND use good style. This includes good documentation practices – your implementation should be easy to verify. Needlessly inefficient circuits will be marked down.

Problem #4

[1 pt.] Implement the function F = A' + ABC using ONLY one multiplexor (of any size). In order to receive credit, your answer must be correct AND use good style. This includes good documentation practices – your implementation should be easy to verify.

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HONOR CODE: Before the end of the examination, please sign:

In recognition of and in the spirit of the Wright State University policies of academic honesty, I certify that I have neither given nor received unpermitted aid in this examination.

Signature: _____

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