Math 160A - Fall 2021 - Quiz #3 - Hand in by 9:30am, Friday, October 8.

Start Time: **Your name:** Answer key

Stop Time: **Integrity signature:**

Time limit 15 minutes. Please add explanation below if over 17 minutes total.

1. Consider the formulas

a. p_3

b. $\neg p_3$

c. $p_7 \wedge \neg p_3$

d. $p_7 \vee \neg p_3$

e. $(p_1 \wedge \neg p_2) \vee \neg(p_1 \wedge p_2)$

f. $p_1 \to p_2$

g. $(p_1 \wedge p_2) \vee (\neg p_1 \wedge p_2)$

h. $(p_1 \vee \neg p_2) \wedge (\neg p_1 \vee p_2)$

- Which of the formulas a. - h. are DNF formulas? a, b, c, d, g
- Which of the formulas a. - h. are CNF formulas? a, b, c, d, h

2. Find a DNF formula that is tautologically equivalent to $p \vee q \to \neg r \wedge \neg s$.
(Do the conversion to DNF straightforwardly: do not write out a 16 line truth table!)

$(\neg p \wedge \neg q) \vee (\neg r \wedge \neg s)$

3. Consider the Boolean function f defined by the table to the left. Give a DNF formula that defines f.

$(p_1 \wedge p_2 \wedge \neg p_3) \vee (\neg p_1 \wedge \neg p_2 \wedge p_3)$

Answer should use propositional variables p_1, p_2, p_3; not variables x_1, x_2, x_3 that represent the T/F inputs to f.

x_3 (typo!)

x_1	x_2	x_2	$f(x_1, x_2, x_3)$
T	T	T	F
T	T	F	T
T	F	T	F
T	F	F	F
F	T	T	F
F	T	F	F
F	F	T	T
F	F	F	F