Homework 1
Due at the beginning of your scheduled lab period

E-mail: _ _ _ _ _ _ _ _ @purdue.edu   **Signature:** _____

Lab Div: ____   **Printed Name:** SOLUTION KEY

---

*Printed copies of these pages along with your original (**hand-annotated**, **not photocopied**) written solution in the space provided (unless otherwise indicated) are required in order to receive credit. NOTE: The purpose of homework is to provide an opportunity for practicing the kinds of problems you will be asked to solve on quizzes and exams – **copying the work of someone else does not accomplish this.***

1. [4 pts] Unsigned base conversions (LO 1-1).   Grading: 1 pt each, no partial credit

   (a) **(7A2C)$_{16}$ to base 2**

   $$7 \quad\quad A \quad\quad 2 \quad\quad C$$
   $$0111 \quad 1010 \quad 0010 \quad 1100_2$$

   (b) **(10010110)$_2$ to base 10**

   $$150_{10}$$

   $$1*2+0 = 2$$
   $$2*2+0 = 4$$
   $$4*2+1 = 9$$
   $$9*2+0 = 18$$
   $$18*2+1 = 37$$
   $$37*2+1 = 75$$
   $$75*2+0 = 150$$

   (c) **(1001111100101010)$_2$ to base 16**

   $$9 \quad F \quad 2 \quad A_{16}$$

   (d) **(9274)$_{10}$ to base 16**

   $$16\overline{)9274} \;\to\; 579 \quad\quad 16\overline{)579} \;\to\; 36 \quad\quad 16\overline{)36} \;\to\; 2 \quad\quad 16\overline{)2} \;\to\; 0$$

   579 → 9264 / 10
   36 / 576 / 3
   2 / -32 / 4
   0 / -0 / 2

   $$(243A)_{16}$$

1

2. [4 pts] For the function $F(X,Y,Z) = X \cdot Y' + Y' \cdot Z$, fill in the truth table, below, along with its dual (F^D) and complement (F') functions (LO 1-4 & 1-5).

X	Y	Z	F(X,Y,Z)	F^D(X,Y,Z)	F′(X,Y,Z)
0	0	0	0	1	1
0	0	1	1	1	0
0	1	0	0	0	1
0	1	1	0	0	1
1	0	0	1	0	0
1	0	1	1	1	0
1	1	0	0	0	1
1	1	1	0	1	1

2 pts   1 pt   1 pt

no partial credit

3. [4 pts] Prove T13 (DeMorgan's Law) for **n=3** using perfect induction (LO 1-6).

1 pt 1 pt 1 pt 1 pt

X1	X2	X3	X1·X2·X3	(X1·X2·X3)′	X1′	X2′	X3′	X1′ + X2′ + X3′
0	0	0	0	1	1	1	1	1
0	0	1	0	1	1	1	0	1
0	1	0	0	1	1	0	1	1
0	1	1	0	1	1	0	0	1
1	0	0	0	1	0	1	1	1
1	0	1	0	1	0	1	0	1
1	1	0	0	1	0	0	1	1
1	1	1	1	0	0	0	0	0

all columns must be shown for full credit

Score: 12 / 12