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4 1. **(4 points total)** Prove the absorption law, $p \vee (p \wedge q) \equiv p$, via use of the logical identities on the front of this page (without using the absorption law)

$p \vee (p \wedge q) = (p \wedge T) \vee (p \wedge q)$	Identity Law
$= p \wedge (T \vee q)$	Distribution
$= p \wedge T$	Domination
$= p$	Identity

4 2. **(4 points total)** Give me the CNF (AKA Product of Sums) and DNF (AKA Sum of Products) for the truth table below

p	q	r	f(p,q,r)	DNF Terms	CNF Terms
0	0	0	1	← $(\neg p \wedge \neg q \wedge \neg r) \vee$	
0	0	1	0		← $(p \vee q \vee \neg r) \wedge$
0	1	0	0		← $(p \vee \neg q \vee r) \wedge$
0	1	1	1	← $(\neg p \wedge q \wedge r) \vee$	
1	0	0	1	← $(p \wedge \neg q \wedge \neg r) \vee$	
1	0	1	0		← $(\neg p \vee q \vee \neg r) \wedge$
1	1	0	0		← $(\neg p \vee \neg q \vee r)$
1	1	1	1	← $(p \wedge q \wedge r)$	

(It's possible to simplify, but you don't need to.)

2 3. **(2 points total)** Give the Duals of the two canonical forms you gave as the last answer

Dual of DNF: $(\neg p \vee \neg q \vee \neg r) \wedge (\neg p \vee q \vee r) \wedge (p \vee \neg q \vee \neg r) \wedge (p \vee q \vee r)$

Dual of CNF: $(p \wedge q \wedge \neg r) \vee (p \wedge \neg q \wedge r) \vee (\neg p \wedge q \wedge \neg r) \vee (\neg p \wedge \neg q \wedge r)$