PHIL07 (Honors)
Midterm Exam

Section 1: Indicate whether the following claims are true ("T") or false ("F") [5 pts each]

1. Some unsound arguments have a true conclusion T____

2. Every invalid argument has a false premise F____

3. If an argument has true premises and a true conclusion, then it is sound. F____

Section 2: Indicate whether the following expressions are WFFs ("yes") or not ("no") [5 pts each]

1. (~(P & P) & (P <-> (Q v ~Q))) Y____

2. (~(P v (Q & R))) N____

Section 3: Using the translation scheme below, translate the following sentences from English to the language of propositional logic. Your translation must be a WFF. [10 pts each]

A = The Cleveland pitcher throws at someone again
B = The Cleveland pitcher is out of the game
C = The Cleveland manager is out of the game
D= The Detroit pitcher throws at someone again
E = The Detroit pitcher is out of the game
F = The Detroit manager is out of the game

1. Provided that neither pitcher throws at someone again, neither manager will be thrown out of the game.

   (~(AvB)->~(CvF)) OR ((~A&~B)->(~C&~F))

2. If either pitcher throws at anyone again, both he and his manager will be thrown out of the game.

   ((A->(A&C))&(D->(D&F)))

3. If both the Cleveland and Detroit managers are out of the game, then exactly one of the two pitchers will throw at someone again.
   ((C&F)->((AvD)&~(A&D)))

Section 4: **Construct proofs for the following sequents.**
[15 pts. each—5 pts allocated for correct notation, 10 pts for a correct and complete proof]

1. ~P, ((PvQ)<->(Rv~P)) ├ Q

1	(1)	~P	A
2	(2)	(PvQ)<->(Rv~P)	A
2	(3)	(Rv~P)->(PvQ)	2<->E
1	(4)	Rv~P	1vI
1,2	(5)	PvQ	3,4->E
1,2	(6)	Q	1,5vE

2. ⊢ ((P<->Q)->((R&P)<->(R&Q)))

1	(1)	P<->Q	A
2	(2)	R&P	A
1	(3)	P->Q	1<->E
2	(4)	P	2&E
1,2	(5)	Q	3,4->E
2	(6)	R	2&E
1,2	(7)	R&Q	5,6&I
1	(8)	(R&P)->(R&Q)	7->I(2)
9	(9)	R&Q	A
9	(10)	R	9&E
9	(11)	Q	9&E
1	(12)	Q->P	1<->E
1,9	(13)	P	11,12->E
1,9	(14)	R&P	10,13&I
1	(15)	(R&Q)->(R&P)	14->I(9)
1	(16)	(R&P)<->(R&Q)	8,15<->I
	(17)	(P<->Q)->((R&P)<->(R&Q))	16->I(1)

3. (PvQ)vR ├ Pv(QvR)

1	(1)	(PvQ)vR	A
2	(2)	~(Pv(QvR))	A
3	(3)	~(PvQ)	A
1,3	(4)	R	1,3vE
1,3	(5)	QvR	4vI
1,3	(6)	Pv(QvR)	5vI
1,2	(7)	PvQ	2,6RAA(3)
8	(8)	~Q	A
1,2,8	(9)	P	7,8vE
1,2,8	(10)	Pv(QvR)	9vI
1,2	(11)	Q	2,10RAA(8)
1,2	(12)	QvR	11vI
1,2	(13)	Pv(QvR)	12vI
1	(14)	Pv(QvR)	2,13RAA(2)

E.C.: _____

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