

$$4) \neg((A \rightarrow \neg B) \vee \neg(C \wedge \neg D))$$

$$\equiv \neg(A \rightarrow \neg B) \wedge (C \wedge \neg D)$$

bringing in outer  $\neg$  + by  
applying  $\neg\neg$

$$\equiv \neg(\neg A \vee \neg B) \wedge (C \wedge \neg D)$$

$$\because p \rightarrow q \equiv \neg p \vee q$$

$$\equiv (A \wedge B) \wedge (C \wedge \neg D)$$

$$\equiv A \wedge B \wedge C \wedge \neg D$$

is the negation normal form