~~3~~ No question Ans:

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12)

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Given,

$p \wedge (p \to q) \to q$

$\equiv p \wedge (\neg p \vee q) \to q$ [other useful)

$\equiv p \wedge \neg(\neg p \vee q) \vee q$ [~~same~~ other useful)

$\equiv p \wedge \neg(\neg p) \vee (\neg q) \vee q$ (De morgan's)

$\equiv p \wedge p \vee \neg q \vee q$ (commutative and other)

$\equiv p \vee T$

$\equiv T$

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So, it's a tautology.

09 No question Ans:

The order of nested quantifiers matters if quantifires are of different type

$\forall x \exists y L(x,y)$ is not the same as $\exists y \forall x L(x,y)$

Example:

* Assume $L(x,y)$ donotes "x loves y"
* Then $\forall x \exists y L(x,y)$
* Translates to: Everybody loves somebod

* Ans: $\exists y \forall x\ L(x,y)$

* Translates to: There is some ome who is loved by everyone.

2 No Question Ans:

Assume: The domain of x is all people

(1) All your friends are parfect.

Tanslation : $\forall x$ perfect (x) or $\forall x\ P(x,y)$

(2) At least on of your friends is parfect.

Tanslation: $\forall x$ al $(x$, perfect$) \rightarrow$ perfect (x)

or $\forall x \exists y\ P(x,y)$

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