I. No PDD due Mon.

II. Consider \( p \Rightarrow q \) (conditional statement).

... Theorem ...

Related to that statement is the new statement \( \sim q \Rightarrow \sim p \) (contrapositive of the conditional).

A conditional statement and its contrapositive are LOGICALLY EQUIVALENT.

II. Consider: "There exists at least one \( x \) with property \( P. \)" Existential Statement.

II. Consider: The negation (or denial) of that statement.

"There are no \( x \)'s with property \( P. \)" Universal Statement.

I. In mathematical logic I is written \( \exists x \in P. \)

There is (exists) - at least one.

II. In mathematical logic II is written \( \forall x \notin P. \) "for all \( x, x \) does not have property \( P. \)"

for all, for each, for every

III. \( \sim (\exists x \in P) \equiv \forall x \notin P \)

Similarly \( \sim (\forall x \in P) \equiv \exists x \notin P \)

C. Consider Thm 4.2 p 117.

Setting (Scenario) \( f_1, f_2, ..., f_n \) here for at least n-1 derivatives

If \( W(f_1, f_2, ..., f_n, 0) \neq 0 \) for at least one \( x \in I \),

then \( f_1, f_2, ..., f_n \) is L.D. on \( I. \)

(\( \exists x \in I \ s.t. \ W(x) \neq 0 \)) \( \Rightarrow P \) \( P \& \{f_1, f_2, ..., f_n\} \) Li

Contrapositive of Thm 4.2:

\( \sim P \Rightarrow \sim (\exists x \in I \ s.t. \ W(x) \neq 0) \)

\( \sim P \Rightarrow (\forall x \in I, W(x) = 0) \)

\( \{f_1, f_2, ..., f_n\} \) is L.D. \( \Rightarrow \forall x \in I, W(x) = 0 \)

Corollary p 118.

Thus the Corollary on p 118 is merely the Contrapositive of Thm 4.2, p 117.
Out of §4.1.3: p. 122
Criterion for Linearly Independent SOLUTIONS

If \( y_1, y_2, \ldots, y_n \) are solutions to an \( n \)th order homogeneous LODE

Then

\[
\{y_1, y_2, \ldots, y_n\} \text{ is L.I. } \iff \left( W(y_1, y_2, \ldots, y_n)(x) \neq 0 \right) \quad (\forall x \in I)
\]

V.I.T. Very Important Theorem.

Def. (P.123) Fundamental Set.

A fundamental set of solutions of an \( n \)th order homogeneous LODE (nHLODE) is a set

\( \{y_1, y_2, \ldots, y_n\} \) which is L.I.

(A fundamental set spans the solution space of the nHLODE)

Thm 4.5 P.123. If \( \{y_1, \ldots, y_n\} \) is a fund.
set of solutions of an nHLODE and if \( Y \) is any
solution of the nHLODE, then \( \exists \ C_1, C_2, \ldots, C_n \) (constants)
s.t.

\[
Y = \sum_{i=1}^{n} C_i y_i
\]