Chapter 3 outline:

- ▶ Propositions, boolean logic, logical equivalences. **Game 1** (last week Friday)
- ▶ Conditional propositions. **SML** (Today)
- ▶ Arguments. **Game 2** (Wednesday)
- ▶ Predicates and quantification. **SML** (Friday)
- ▶ Quantified arguments. **Game 3** (Next week Monday)
- ▶ Review for test. (Next week Wednesday)

So far:

► $\mathbb{B} = \{T, F\}$, $\wedge$, $\vee$, $\sim$, propositional calculus
► Verifying logical equivalences between propositional forms (Game 1)

Today—how to model propositional forms that have an if/then structure (§3.(5–7)):

► Highlight the most important parts
► Highlight the most confusing parts
► Work on some SML examples

p	q	$p \wedge q$	$p \vee q$	$\sim p$	$\sim p \vee q$	$p \rightarrow q$
T	T	T	T	F	T	T
T	F	F	T	F	F	F
F	T	F	T	T	T	T
F	F	F	F	T	T	T

	p		*q*
If	12 divides 36 evenly,	then	3 divides 72 evenly.
If	$3 < 72$,	then	3 divides 72 evenly.
If	12 divides 36 evenly,	then	$72 < 3$.
If	$72 < 3$,	then	3 divides 72 evenly.
If	$72 < 3$,	then	12 divides 3 evenly.

T	S	R	Q	P
K	L	M	N	O
J	I	H	G	F
E	D	C	B	A

1. Bob passed through *P*.
2. Bob passed through *N*.
3. Bob passed through *M*.
4. If Bob passed through *O*, then Bob passed through *F*.
5. If Bob passed through *K*, then Bob passed through *L*.
6. If Bob passed through *L*, then Bob passed through *K*.

"If Fred was at the dock at midnight, then he's the murderer."

"If it's raining at home and the windows are still open, then water is coming in."

"If I were John and John were me, then he'd be six and I'd be three." — A. A. Milne

"If the dryer is finished, then unload it."

"If you finish your spinach, then I will give you some cake."

"If it rains tomorrow, the zucchini will sprout."

An even degree is a necessary condition for a polynomial to have no real roots .
means
If a polynomial function has no real roots, then it has an even degree.

A positive global minimum is a sufficient condition for a polynomial to have no real roots
means
If a polynomial function has a positive global minimum, then it has no real roots.

Values all of the same sign is a necessary and sufficient condition for a polynomial to have no real roots.
means
A polynomial function has values all of the same sign if and only if the function has no real roots.

| | | (original) | | | | | |
| | | conditional | converse | inverse | contrapositive | negation | biconditional |
p	q	$p \rightarrow q$	$q \rightarrow p$	$\sim p \rightarrow \sim q$	$\sim q \rightarrow \sim p$	$p \wedge \sim q$	$p \leftrightarrow q$
T	T	T	T	T	T	F	T
T	F	F	T	T	F	T	F
F	T	T	F	F	T	F	F
F	F	T	T	T	T	F	T

Conditional expression:

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if (expr1) then (expr2) else (expr3)
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For next time:
  Pg 108: 3.5.(1 & 2)
  Pg 114: 3.7.(1, 2, 7, 8, 9, 12, 13)

  Take quiz

  Read 3.(8 & 9)