# Syllogism Forms

Janet Davis, from VanDrunen (2013), sections 3.8 and 3.14

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| Modus ponens | Modus tollens | Elimination | Contradiction |
|---|---|---|---|
| $p \to q$<br>$p$<br>$\therefore\ q$ | $p \to q$<br>$\sim q$<br>$\therefore \sim p$ | $p \vee q$<br>$\sim p$<br>$\therefore\ q$ | $p \to F$<br>$\therefore \sim p$ |

| Generalization | Specialization | Transitivity | Division into cases |
|---|---|---|---|
| $p$<br>$\therefore\ p \vee q$ | $p \wedge q$<br>$\therefore\ p$ | $p \to q$<br>$q \to r$<br>$\therefore\ p \to r$ | $p \vee q$<br>$p \to r$<br>$q \to r$<br>$\therefore\ r$ |

| Universal modus ponens | Universal modus tollens | Universal instantiation | Universal generalization |
|---|---|---|---|
| $\forall x \in A, P(x) \to Q(x)$<br>$a \in A$<br>$P(a)$<br>$\therefore\ Q(a)$ | $\forall x \in A, P(x) \to Q(x)$<br>$a \in A$<br>$\sim\ Q(a)$<br>$\therefore \sim\ P(a)$ | $\forall x \in A, P(x)$<br>$a \in A$<br>$\therefore\ P(a)$ | Suppose $a \in A$<br>$P(a)$<br>$\therefore\ \forall\ x \in A, P(x)$ |

| Hypothetical conditional | Hypothetical division into cases | Existential instantiation | Existential generalization |
|---|---|---|---|
| Suppose $p$<br>$q$<br>$\therefore\ p \to q$ | $p \vee q$<br>Suppose $p$<br>$r$<br>Suppose $q$<br>$r$<br>$\therefore\ r$ | $\exists\ x \in A \mid P(x)$<br>Let $a \in A \mid P(a)$<br>$\therefore\ a \in A \wedge P(a)$ | $a \in A$<br>$P(a)$<br>$\therefore\ \exists\ x \in A \mid P(x)$ |