

# Some of the main flowchart forms

	Using	Proving
$p$ and $q$	<pre> graph TD     A["p ∧ q"] --&gt; B["p"]     A --&gt; C["q"]           </pre>	<pre> graph TD     A["p"] --&gt; C["p ∧ q"]     B["q"] --&gt; C           </pre>
If $p$ , then $q$	<pre> graph TD     subgraph Modus_Ponens         A["p → q"] --&gt; C["q"]         B["p"] --&gt; C     end     subgraph Modus_Tollens         D["p → q"] --&gt; F["¬p"]         E["¬q"] --&gt; F     end           </pre> <p>modus ponens</p> <p>modus tollens</p>	<pre> graph TD     subgraph Direct_proof         A["Assume p"] --&gt; B["..."] --&gt; C["Prove q"]     end     subgraph Pf_by_contrapositive         D["Assume ¬q"] --&gt; E["..."] --&gt; F["Prove ¬p"]     end     subgraph Pf_by_contradiction         G["Assm p. Assm ¬q."] --&gt; H["..."] --&gt; I["Obtain contradiction"]     end           </pre> <p>Direct proof</p> <p>Pf by contrapositive</p> <p>Pf by contradiction</p>
$\forall x \in U, P(x)$	<pre> graph TD     A["∀x ∈ U [P(x)]"] --&gt; C["P(y)"]     B["y ∈ U"] --&gt; C           </pre>	<pre> graph TD     A["Let a ∈ U be arbitrary."] --&gt; B["..."] --&gt; C["Prove P(a)"]           </pre>
$\exists x \in U$ s.t. $P(x)$	<pre> graph TD     A["∃x ∈ U [P(x)]"] --&gt; B["Let b ∈ U satisfying P(b)."]     B --&gt; C["b ∈ U"]     B --&gt; D["P(b)"]           </pre>	<pre> graph TD     A["Define an appropriate object c"] --&gt; B["Prove c ∈ U"]     A --&gt; C["Prove P(c)"]     B --&gt; D["Conclude ∃x ∈ U [P(x)]"]     C --&gt; D           </pre>
<b>Definition:</b> We say $z$ is a <u>borogove</u> if $P(z)$ .	<pre> graph TD     A["z is a borogove."] --&gt; B["P(z)"]           </pre>	<pre> graph TD     A["P(z)"] --&gt; B["z is a borogove."]           </pre>