

**Table 1: Three-level rubric**

<b>Grade</b>	<b>Proof writing</b>	<b>Key ideas and application</b>	<b>Clarity and explanation</b>
Success	Complete proof outline given with little or no extra help needed	<ul style="list-style-type: none"> <li>○ Identified and used an appropriate proof technique.</li> <li>○ Identified key ideas and concepts of the proof.</li> <li>○ Can answer questions about the proof technique.</li> <li>○ Can answer questions about the mathematical concepts involved in the proof.</li> <li>○ May need a little help.</li> </ul>	<ul style="list-style-type: none"> <li>○ Explains clearly and concisely in both written and oral form.</li> <li>○ Proof presented such that peers and professor can follow the logical reasoning easily.</li> <li>○ Can provide correct definitions for the objects used in the proof.</li> </ul>
Growing	Complete proof outline given with substantial extra help	<ul style="list-style-type: none"> <li>○ Identified some key ideas and concepts of the proof.</li> <li>○ May not fully distinguish between some proof techniques.</li> <li>○ Gaps may include fundamental math errors or misunderstandings.</li> <li>○ Can answer questions about the proof technique or mathematical concepts with substantial help.</li> </ul>	<ul style="list-style-type: none"> <li>○ Explanations need some or extensive probing to clarify in either written or oral form.</li> <li>○ Proof has some issues in the mathematical writing or reasoning.</li> <li>○ Incorrect or inappropriate symbol usage.</li> <li>○ Can provide correct definitions for the objects used in the proof with substantial help.</li> </ul>
Not Yet	Complete proof not obtained, but some key steps made with help	<ul style="list-style-type: none"> <li>○ Cannot identify key ideas or concepts of the proof.</li> <li>○ Cannot distinguish between proof techniques.</li> <li>○ Cannot answer questions about mathematical concepts even with substantial help.</li> </ul>	<ul style="list-style-type: none"> <li>○ Significant difficulty giving explanations in written or oral form.</li> <li>○ Proof presented with little clarity.</li> <li>○ Evidence of confusion.</li> <li>○ Cannot recall or explain some objects or definitions even with substantial help.</li> </ul>

**Table 2: Six-level rubric**

<b>Grade</b>	<b>Proof writing</b>	<b>Key ideas and application</b>	<b>Clarity and explanation</b>
Success - 5	Complete proof outline given with little or no extra help needed	<ul style="list-style-type: none"> <li>○ Correct, complete, convincing, and clear.</li> <li>○ Identified and used an appropriate proof technique.</li> <li>○ Identified key ideas and concepts of the proof.</li> <li>○ Can answer questions about the proof technique.</li> <li>○ Can answer questions about the mathematical concepts involved in the proof.</li> <li>○ Finds own errors and corrects them.</li> <li>○ No assistance needed.</li> </ul>	<ul style="list-style-type: none"> <li>○ Explains clearly and concisely in both written and oral form.</li> <li>○ Proof presented such that peers and professor can follow the logical reasoning easily.</li> <li>○ Can provide correct definitions for the objects used in the proof.</li> <li>○ Errors are trivial.</li> </ul>
Success - 4	Complete proof outline given with some extra help needed	<ul style="list-style-type: none"> <li>○ Demonstrates understanding of the relevant concepts.</li> <li>○ Identified and used an appropriate proof technique.</li> <li>○ Identified key ideas and concepts of the proof.</li> <li>○ Can answer questions about the proof technique.</li> <li>○ Can answer questions about the mathematical concepts involved in the proof.</li> <li>○ May not identify errors, but can correct them when pointed out.</li> <li>○ May need a little help.</li> </ul>	<ul style="list-style-type: none"> <li>○ Explains clearly and concisely in both written and oral form.</li> <li>○ Proof presented such that peers and professor can follow the logical reasoning.</li> <li>○ A few minor steps may be poorly explained or difficult to follow.</li> <li>○ Can provide correct definitions for the objects used in the proof with little help.</li> </ul>
Growing - 3	Complete proof outline given with substantial extra help	<ul style="list-style-type: none"> <li>○ Demonstrates partial understanding of the relevant concepts and useful progress has been made, but there is a major gap.</li> <li>○ Identified some key ideas and concepts of the proof.</li> <li>○ Gaps may include fundamental math errors or misunderstandings.</li> </ul>	<ul style="list-style-type: none"> <li>○ Explanations need some probing to clarify in either written or oral form.</li> <li>○ Proof has some issues in the mathematical writing or reasoning.</li> <li>○ Incorrect or inappropriate symbol usage.</li> <li>○ Can provide correct definitions for the objects used in the proof with substantial help.</li> </ul>

Grade	Proof writing	Key ideas and application	Clarity and explanation
		<ul style="list-style-type: none"> <li>○ May not fully distinguish between some proof techniques.</li> <li>○ Can answer questions about the proof technique or mathematical concepts with substantial help.</li> </ul>	
Growing - 2	Complete proof outline given with substantial extra help	<ul style="list-style-type: none"> <li>○ Demonstrates partial understanding of the relevant concepts and useful progress has been made, but there is more than one major gap.</li> <li>○ Identified some key ideas and concepts of the proof with substantial help.</li> <li>○ Gaps may include fundamental math errors or misunderstandings.</li> <li>○ Does not fully distinguish between some proof techniques.</li> <li>○ Can answer questions about the proof technique or mathematical concepts with substantial help.</li> </ul>	<ul style="list-style-type: none"> <li>○ Explanations need extensive probing to clarify in either written or oral form.</li> <li>○ Proof presented is confusing or hard to follow.</li> <li>○ Incorrect or inappropriate symbol usage.</li> <li>○ Can provide correct definitions for the objects used in the proof with substantial help.</li> </ul>
Not Yet - 1	Complete proof not obtained, but some key steps made with help	<ul style="list-style-type: none"> <li>○ Cannot identify key ideas or concepts of the proof.</li> <li>○ Cannot distinguish between proof techniques.</li> <li>○ Cannot answer questions about mathematical concepts even with substantial help.</li> </ul>	<ul style="list-style-type: none"> <li>○ Significant difficulty giving explanations in written or oral form.</li> <li>○ Proof presented with little clarity.</li> <li>○ Evidence of confusion.</li> <li>○ Cannot recall or explain some objects or definitions even with substantial help.</li> </ul>
Not Yet - 0	Complete proof not obtained, no progress made even with substantial help	<ul style="list-style-type: none"> <li>○ Nothing of substance presented</li> </ul>	<ul style="list-style-type: none"> <li>○ No explanations attempted</li> </ul>