Latex help: "a divides b" and "a does not divides b" and "a is congruent to b mod n" and "a is not congruent to b mod n":

$$a \mid b \quad , \quad a \nmid b \quad , \quad a \equiv b \pmod{n} \quad , \quad a \not\equiv b \pmod{n}.$$

Do not forget needed parentheses: $a \mid (b - 17)$ is correct while $a \mid b - 17$ is not right.

The Ch 3: Methods of Proofs handout gave several formulation of $a \equiv b \pmod{n}$ and remarked: You can use (on HW& exams, unless otherwise indicated) any of the above equivalent formations as the definition of $a \equiv b \pmod{n}$. See (1)-(5) and (1')-(5'). The Ch. 3 handout also explains Modulo Arithmetic and transitivity.

▶. **Theorem 1**. For integers a and b, if $a \equiv 7 \pmod{8}$ and $b \equiv 3 \pmod{8}$, then $ab \equiv 5 \pmod{8}$.

1. Symbolically write Theorem 1.

2. Prove Theorem 1 using Modulo Arithmetic and the fact that congruence is transitive. In your proof:

   - specifically state where you are using the transitivity of congruence
   - the only place you should use the definition of congruence (in any form) is to do calculations with specific integers (and explain this step). I.e.: Note $27 \equiv 3 \pmod{8}$ by definition of congruence modulo 8 since $27 - 3 = 24$ and $8 \mid 24$.

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   DELETE this whole sentence and THEN put your answer to ALL parts down here.