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# Math Club: Biweekly Contest Week Four

**Release Date:** October 18, 2023

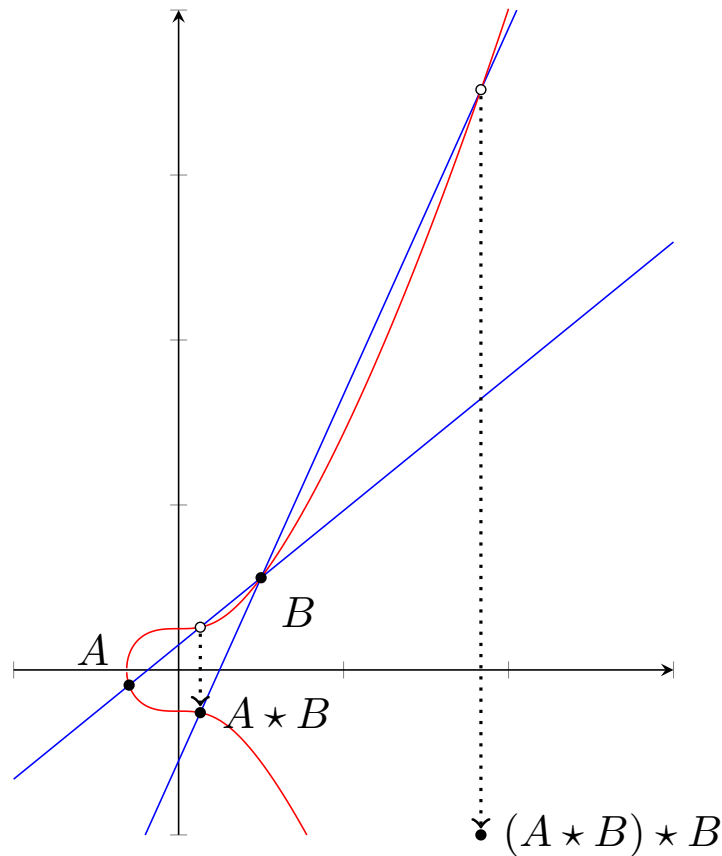
**Instructions:** Solve the following problem as best you can. The first student to submit the correct solution via email to tamumathcontest@gmail.com or to Jeremy Kubiak in Blocker 336D (with time stamp) wins!

**Problem 1.** Let  $P = (x_p, y_p)$  and  $Q = (x_q, y_q)$  be two solutions to the equation  $y^2 = x^3 + 17$  such that  $P \neq Q$  and  $x_p \neq x_q$ . We define an operation  $P \star Q$ ; construct a line interpolating  $P$  and  $Q$ , this line will intersect  $y^2 = x^3 + 17$  at a third point  $R \neq P \neq Q$  with  $R = (x_r, y_r)$ . We let

$$P \star Q = (x_r, -y_r), \quad \text{note this is the reflection of } R \text{ over the } x\text{-axis.}$$

Let  $A = (-2, -3)$  and  $B = (4, 9)$ , compute  $C = (A \star B) \star B$ .

**Hint.** Geometrically your construction should look roughly as follows



with  $(A \star B) \star B$  lying on the red curve out of range of the displayed graph.