PROBLEM OF THE WEEK #1
(Spring 2021)

Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, and let S' denote $U - S$, the complement of S in U.
In how many ways can we find subsets A, B, and C of U with the following six properties?

$$
\begin{aligned}
A \cap B &= \{4\} \\
A \cap C &= \{3\} \\
B \cap C &= \varnothing \\
A \cup C &= \{2, 3, 4, 5, 7, 9\} \\
|A \cap B'| &= 3 \\
|(A \cup B \cup C)'| &= 2
\end{aligned}
$$

[Please fully explain your answer.]

Email your solution to `kwonmi@uwplatt.edu` by 4:00 P.M. on Wednesday, February 3, 2020.

Every week, the best solution submitted earns a \$10 Platteville gift certificate; the top scorer each semester also wins a cash award. Good luck!
You can always see the Problem of the Week (and complete rules) online at:

$$\texttt{http://uwpmath.weebly.com/}$$