# Puzzle of the Week
# *Fractions – 5*

**Example:** 2/5 is less than 1/2,  19/38 equals 1/2, and 4/7 is larger than 1/2. The difference between 4/7 and 2/5 is (4/7 - 1/2) + (1/2 - 2/5) = 1/14 + 1/10, which is not particularly small. The fractions 2/5, 19/38, and 4/7 use the digits 1 to 9 at most once each.

THE CHALLENGE: Use the numbers 1 to 9 at most once each to fill in these boxes. Make the difference between the largest and smallest fraction as small as possible.

$$\frac{\square}{\square} < \frac{1}{2}$$

$$\frac{\square\square}{\square\square} = \frac{1}{2}$$

$$\frac{\square}{\square} > \frac{1}{2}$$

**1 2 3 4 5 6 7 8 9**

# Puzzle of the Week
# *Fractions – 5 – Notes*

THE CHALLENGE: After some initial exploring, it is clear that 1/14 + 1/18 is the best possible difference. That difference comes from using denominators of 7 and 9, and there are no better ones. The only ways to get that difference are: 5/9 - 3/7 or 4/7 - 4/9, and the second one is not allowed because four is repeated.

If 3, 5, 7, and 9 are used on the outside fractions, that only leaves 1, 2, 4, 6, and 8 to be used for the middle fraction. There are only two ways to get 1/2 using those numbers without repeating a digit: 14/28 and 41/82.

This leaves two entries tied for first place:

3/7 < 14/28 = 1/2 < 5/9

3/7 < 41/82 = 1/2 < 5/9