Add the two negative numbers first. $\left|-2\frac{1}{3}\right| + \left|-\frac{5}{6}\right| = 2\frac{1}{3} + \frac{5}{6} = \frac{14}{6} + \frac{5}{6} = \frac{19}{6} = 3\frac{1}{6}$

Since the addends are negative, that sum is $-3\frac{1}{6}$. Add this to $7\frac{3}{4}$ by finding the difference of their absolute values:

$7\frac{3}{4} - 3\frac{1}{6} = 7\frac{9}{12} - 3\frac{2}{12} = 4\frac{7}{12}$. Since $7\frac{3}{4} > 3\frac{1}{6}$, the answer is positive.