$$\frac{y}{2y-3}+\frac{1}{y+7}+\frac{17}{2y^2+11y-21}=0$$

ОДЗ.

$$\begin{cases} 2y-3\neq 0\ (1) \\ y+7\neq 0\ (2) \\ 2y^2+11y-21\neq 0\ (3) \end{cases}$$

$$\frac{y}{2y-3}+\frac{1}{y+7}+\frac{17}{(y+7)(2y-3)}=0$$

$$\frac{y(y+7)}{(2y-3)(y+7)}+\frac{2y-3}{(y+7)(2y-3)}+\frac{17}{(y+7)(2y-3)}=0$$

$$\frac{y(y+7)+(2y-3)+17}{(2y-3)(y+7)}=0$$

$$\frac{(y^2+7y)+(2y-3)+17}{(2y-3)(y+7)}=0$$

$$\frac{y^2+7y+2y-3+17}{(2y-3)(y+7)}=0$$

$$\frac{y^2+9y+14}{(2y-3)(y+7)}=0$$

$$\frac{(y+2)(y+7)}{(2y-3)(y+7)}=0$$

$$\frac{y+2}{2y-3}=0$$

$$y+2=0$$

$$y=-2$$

$y=-2$ удовлетворяет ОДЗ.

ответ: $y=-2$.