Setting, $y=4x^2+5x$ we get,

$$8x^2+10x+3=\frac{1}{4x^2+7x+3}\Leftrightarrow 2y+3=\frac{1}{y+2x+3}\Leftrightarrow 2y^2+(4x+9)y+(6x+8)=0$$

Using qudratic formula for, y we get, $y=\frac{-(4x+9)\pm\sqrt{(4x+9)^2-8(6x+8)}}{4}$

Putting the value of y and after some calculation we get, $\Leftrightarrow 16x^2+24x+9=\pm\sqrt{16x^2+24x+17}$ Here, $16x^2+24x+9=(4x+3)^2>0$ So,$16x^2+24x+9=\sqrt{16x^2+24x+17}(1)(Hereisassumethatwewantthesolutionfor\text{x}\in R$, if it is not the case we can do in the same way) Setting $(4x+3)^2=z$ in (1)we get, $z=\sqrt{z+8}$ Solving this we get, $z=\frac{1+\sqrt{33}}{2}$ And putting the value of, z we get, $x=\frac{-3\pm\sqrt{\frac{1+\sqrt{33}}{2}}}{4}$