1 Solve $\frac{1}{2x-1}+\frac{3}{x-1}=1$

Give your answer in the form $\frac{p\pm\sqrt{q}}{2}$ where p and q are integers.

$\frac{1}{2x-1} + \frac{3}{x-1} = 1$

cross multiply ✓①

$\frac{1(x-1) + 3(2x-1)}{(2x-1)(x-1)} = 1$

$x-1 + 6x - 3 = (2x-1)(x-1)$

$7x - 4 = 2x^2 - 3x + 1$

$0 = 2x^2 - 10x + 5$ ✓①

quadratic formula $\frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$\frac{10 \pm \sqrt{(-10)^2 - (4\times2\times5)}}{2\times2}$ ✓①

$= \frac{10 \pm \sqrt{100 - 40}}{4}$

$\frac{10 \pm \sqrt{60}}{4}$ ÷2

roots can only ÷ with roots. Have to do $\sqrt{60} \div \sqrt{4}$ ↓ $= \sqrt{15}$

$\frac{5 \pm \sqrt{15}}{2}$ ✓①

$\frac{5 \pm \sqrt{15}}{2}$

(Total for Question 1 is 4 marks)

2 Solve $6x^2 + 5x - 6 = 0$

use formula : $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$= \frac{-5 \pm \sqrt{(5)^2 - 4(6)(-6)}}{2(6)}$ (1)

$= \frac{-5 \pm \sqrt{169}}{12}$ (1) $= \frac{-5 \pm 13}{12}$

$= \frac{-5 + 13}{12}, \frac{-5 - 13}{12}$

$= \frac{8}{12}, \frac{-18}{12}$

$= \frac{2}{3}, -\frac{3}{2}$ (1)

$\frac{2}{3}$ and $-\frac{3}{2}$

(Total for Question 2 is 3 marks)

3 Find the set of possible values of x for which

$$4x^2 - 25 < 0 \quad \textbf{and} \quad 12 - 5x - 3x^2 > 0$$

You must show all your working.

$4x^2 - 25 < 0$

$+25 \quad +25$

$4x^2 < 25$

$\div 4 \quad \div 4$

$x^2 < \frac{25}{4}$ ✓(1)

square root could be positive or negative (sign change)

$x < \frac{5}{2} \quad x > -\frac{5}{2}$

$-\frac{5}{2} < x < \frac{5}{2}$

or

$-2.5 < x < 2.5$ ✓(1)

$12 - 5x - 3x^2 > 0$

multiply by -1 and flip sig

$3x^2 + 5x - 12 < 0$

numbers that x to get -36 are +9 and -4
+ to get +5

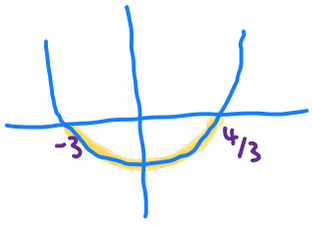
rewrite as $3x^2 + 9x - 4x - 12 < 0$

$3x(x+3) - 4(x+3) < 0$

match

$(x+3)(3x-4) < 0$ ✓(1)

graph

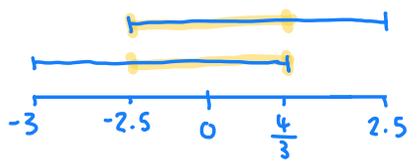


0 is greater so under the x axis

$-3 < x < \frac{4}{3}$ ✓(1)

To fit both inequalities $-2.5 < x < 2.5$

$-3 < x < \frac{4}{3}$



shaded : $-2.5 < x < \frac{4}{3}$ ✓

✓(1)

$-2.5 < x < \frac{4}{3}$

(Total for Question 3 is 5 marks)