1. (5 pts) Solve the equation:

$$\frac{2x+1}{3x-2} = \frac{x+5}{3x-1}$$

(i) Cross multiply:

$$\frac{2x+1}{3x-2} = \frac{x+5}{3x-1} \implies (2x+1)(3x-1) = (x+5)(3x-2)$$

(ii) Expand both sides of the equation:

$$(2x+1)(3x-1) = (x+5)(3x-2) \implies 6x^2 + x - 1 = 3x^2 + 13x - 10$$

(iii) Collect terms (on the left):

$$6x^2 + x - 1 = 3x^2 + 13x - 10 \implies 3x^2 - 12x + 9 = 0$$

(iv) Solve quadratic equation by factoring...

$$3x^2 - 12x + 9 = 0 \implies 3(x^2 - 4x + 3) = 0 \implies 3(x-1)(x-3) = 0 \implies x_1 = 1 \text{ and } x_2 = 3$$

... or using the quadratic formula:

$$3x^2 - 12x + 9 = 0 \implies x = \frac{12 \pm \sqrt{144 - 108}}{6} = \frac{12 \pm \sqrt{36}}{6} \implies x_1 = \frac{12-6}{6} = 1 \text{ and } x_2 = \frac{12+6}{6} = 3$$

2. (5 pts) Solve the pair of equations:

$$\begin{aligned} 5x + 2y &= 3 \\ 7x + 3y &= 11 \end{aligned}$$

(i) Multiply first equation by 3 and second equation by 2:

$$\left.\begin{array}{rcl} 5x + 2y &=& 3 \\ 7x + 3y &=& 11 \end{array}\right\} \implies \left\{\begin{array}{rcl} 15x + 6y &=& 9 \\ 14x + 6y &=& 22 \end{array}\right.$$

(ii) Subtract second equation from first equation:

$$\begin{array}{rcl} (15x + 6y &=& 9) \\ -(14x + 6y &=& 22) \\ \hline x + 0 \cdot y &=& -13 \end{array}$$

(iii) Substitute $x = -13$ into (original) first equation:

$$5(-13) + 2y = 3 \implies 2y = 3 + 65 \implies y = 34.$$

(iv) Solution: $(x, y) = (-13, 34)$.

3. (5 pts) $\displaystyle\lim_{x\to 1} \frac{x^2 + x - 2}{x^2 - 1} = \lim_{x\to 1} \frac{(x+2)\cancel{(x-1)}}{(x+1)\cancel{(x-1)}} = \frac{\lim_{x\to 1}(x+2)}{\lim_{x\to 1}(x+1)} = \frac{3}{2}$

4. (5 pts) $\displaystyle\lim_{h\to 0} \frac{(x+h)^2 - x^2}{h} = \lim_{h\to 0} \frac{\cancel{x^2} + 2xh + h^2 - \cancel{x^2}}{h} = \lim_{h\to 0} \frac{\cancel{h}(2x+h)}{\cancel{h}} = \lim_{h\to 0} 2x + h = 2x$