1. (5 pts) Solve the pair of equations:

$$\begin{aligned} &5(2x+3y=12)\\ &-2(5x-2y=11)\\ \hline &0\cdot x+19y=38\\ &\qquad\Rightarrow y=38/19=2 \end{aligned}$$

$$\begin{aligned} &2(2x+3y=12)\\ &+3(5x-2y=11)\\ \hline &19x+0\cdot y=57\\ &\qquad\Rightarrow x=57/19=3 \end{aligned}$$

Solution: $(x, y) = (3, 2)$.

2. (5 pts) Solve the equation:

$$\frac{3x+2}{3x-2} = \frac{5x+2}{x+4}$$

(i) Cross-multiply:

$$(3x+2)(x+4) = (5x+2)(3x-2).$$

(ii) Simplify:

$$3x^2 + 14x + 8 = 15x^2 - 4x - 4 \Rightarrow 12x^2 - 18x - 12 = 0 \Rightarrow 2x^2 - 3x - 2 = 0$$

(iii) Use quadratic formula to find solutions:

$$x = \frac{3 \pm \sqrt{9+16}}{4} \Rightarrow x_1 = \frac{3+5}{4} = 2 \text{ and } x_2 = \frac{3-5}{4} = -\frac{1}{2}.$$

3. (3 pts) $\lim\limits_{x\to 3} \dfrac{x^2+3x-10}{x^2-4} = \dfrac{\lim\limits_{x\to 3} x^2+3x-10}{\lim\limits_{x\to 3} x^2-4} = \dfrac{3^2+3\cdot 3-10}{3^2-4} = \dfrac{8}{5}$

4. (3 pts) $\lim\limits_{x\to\infty} \dfrac{3+5x-x^2+2x^3}{4x^3-3x^2+x-5} = \lim\limits_{x\to\infty} \dfrac{2\cancel{x^3}}{4\cancel{x^3}} = \dfrac{1}{2}$

5. (4 pts)

$$\begin{aligned} \lim_{h\to 0} \frac{\sqrt{9+h}-3}{h} &= \lim_{h\to 0} \frac{\left(\sqrt{9+h}-3\right)\cdot\left(\sqrt{9+h}+3\right)}{h\cdot\left(\sqrt{9+h}+3\right)} \\ &= \lim_{h\to 0} \frac{\cancel{9}+h-\cancel{9}}{h\cdot\left(\sqrt{9+h}+3\right)} \\ &= \lim_{h\to 0} \frac{\cancel{h}}{\cancel{h}\cdot\left(\sqrt{9+h}+3\right)} \\ &= \frac{1}{\lim\limits_{h\to 0}\sqrt{9+h}+3} = \frac{1}{\sqrt{9}+3} = \frac{1}{6} \end{aligned}$$