

$$\textcircled{1} \quad x^4 - x^3 - 13x^2 + x + 12 = (x-1)(x+1)(x-4)(x+3)$$

	1	-1	-13	+1	+12	
1	1	0	-13	-12	0	
-1	-1	+1	+12			
	1	-1	-13	0		
4	4	12				
	1	3	0			
-3	-3					
	1	0				

$$x^3 - 13x + 12 = (x-1)(x-3)(x+4)$$

	1	0	-13	+12	
+1	1	1	-12	0	
3	3	12			
	1	4	0		
-4	-4				
	1	0			

$$\begin{array}{r} (x-1) \\ x+2 \\ \hline 2x-2 \\ x^2-x \\ \hline x^2+x-2 \end{array}$$

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

$$= \frac{3x+6+x-1-2x^2+4-2x}{(x-1)(x+2)} =$$

$$\left. \begin{array}{l} x-1 \\ x+2 \end{array} \right\} \text{m.c.m.} = (x-1)(x+2)$$

$$= \frac{-2x^2+2x+9}{(x-1)(x+2)}$$

$$\textcircled{2} \text{ b) } \frac{x-1}{x^2} + \frac{1}{2x} - \frac{5}{x-4} = \frac{(x-1) \cdot 2(x-4) + x(x-4) - 5 \cdot 2x^2}{2x^2(x-4)}$$

$$\begin{cases} x^2 = x^2 \\ 2x = 2x \\ x-4 = x-4 \end{cases}$$

$$2x^2(x-4) \parallel = \frac{2x^2 - 8x - 2x + 8 + x^2 - 4x - 10x^2}{2x^2(x-4)}$$

$$= \frac{-7x^2 - 14x + 8}{2x^2(x-4)}$$

$$\textcircled{3} \left. \begin{cases} 2(x+1) - y = 2y + 3 \\ 4(x+y) - x + 2y = 9x \end{cases} \right\} \Rightarrow \left. \begin{cases} 2x + 2 - y = 2y + 3 \\ 4x + 4y - x + 2y = 9x \end{cases} \right\}$$

$$\left. \begin{cases} 2x - y - 2y = 3 - 2 \\ 4x - x - 9x + 4y + 2y = 0 \end{cases} \right\}$$

$$6y = 6x \rightarrow \boxed{y = x}$$

$$\begin{cases} 2x - 3y = 1 \\ -6x + 6y = 0 \end{cases}$$

$$2x - 3x = 1 \quad -x = 1$$

$$\boxed{x = -1} \quad \boxed{y = -1}$$

$$\textcircled{4} \left. \begin{cases} 3x - 2y = -19 \\ 2x + 5y = 0 \end{cases} \right\} \begin{cases} 3x = 2y - 19 & x = \frac{2y - 19}{3} \\ 2x = -5y & \rightarrow x = \frac{-5y}{2} \end{cases}$$

$$\frac{2y - 19}{3} = \frac{-5y}{2} \rightarrow 4y - 38 = -15y + 4y + 15y = +38$$

$$y = \frac{38}{19} = 2 \quad \boxed{y = 2}$$

$$x = \frac{-5 \cdot 2}{2} = -5 \quad \boxed{x = -5}$$

(5)
 a) $\frac{2(x-3)}{7} - \frac{1-6x}{14} + \frac{5(x-2)}{2} = 1$

$$\frac{2x-6}{7} - \frac{1-6x}{14} + \frac{5x-10}{2} = 1$$

$$\frac{4x-12 - 1+6x + 35x-70}{14} = \frac{14}{14}$$

$$4x+6x+35x = 14+70+1+12 \rightarrow 45x = 97$$

$$x = \frac{97}{45}$$

b) $2x + 3(x-4)^2 = 37 + (x-3)(x+3)$

$$2x + 3(x^2 + 16 - 8x) = 37 + x^2 - 9$$

$$2x + 3x^2 + 48 - 24x = 37 + x^2 - 9$$

$$3x^2 - x^2 + 2x - 24x + 48 - 37 + 9 = 0$$

$$2x^2 - 22x + 20 = 0$$

$$x^2 - 11x + 10 = 0$$

$$x = \frac{+11 \pm \sqrt{121 - 4 \cdot 1 \cdot 10}}{2 \cdot 1}$$

$$x = \frac{11 \pm \sqrt{81}}{2} = \frac{11 \pm 9}{2}$$

$$x_1 = \frac{11+9}{2} = 10$$

$$x_2 = \frac{11-9}{2} = 1$$

c) $3x^2 - 2x + 1 = 0$

$$x = \frac{2 \pm \sqrt{4 - 4 \cdot 3 \cdot 1}}{2 \cdot 3} = \frac{2 \pm \sqrt{4 - 12}}{6} = \frac{2 \pm \sqrt{-8}}{6}$$



6) a)

$$3x^4 - 4x^3 + 5x - 2$$

$$2x^3 - 3x + 4$$

$$\begin{array}{r} 6x^7 - 8x^6 \\ + 10x^4 - 4x^3 \\ + 12x^4 - 16x^3 + 20x - 8 \\ \hline \end{array}$$

$$6x^7 - 8x^6 - 9x^5 + 34x^4 - 20x^3 - 15x^2 + 26x - 8$$

$$\begin{array}{r} 2x^5 + 0x^4 + 5x^3 - 3x^2 + 0x - 7 \quad | \quad x^2 - 3x + 2 \\ - 2x^5 + 6x^4 - 4x^3 \\ \hline \end{array}$$

$$\begin{array}{r} 6x^4 + x^3 - 3x^2 \\ - 6x^4 + 18x^3 - 12x^2 \\ \hline \end{array}$$

$$\begin{array}{r} 19x^3 - 15x^2 + 0x \\ - 19x^3 + 57x^2 - 38x \\ \hline \end{array}$$

$$\begin{array}{r} + 42x^2 - 38x - 7 \\ - 42x^2 + 126x - 84 \\ \hline \end{array}$$

$$\begin{array}{r} 88x - 91 \\ \hline \end{array}$$