5HKS, 30.9.2019

① $k(x) = \frac{1}{3}x^2 - \frac{14}{3}x + \frac{31}{3}$

$A(7/-6)$: $k(x=7) = \frac{49}{3} - \frac{98}{3} + \frac{31}{3} = -\frac{18}{3} = -6$

$\Rightarrow A \in k$

$B(-2/21)$: $k(x=-2) = \frac{4}{3} - \frac{-28}{3} + \frac{31}{3} = \frac{63}{3} = 21$

$\Rightarrow B \in k$

② $f(x) = -\frac{1}{2}x^2 + 6x - 10$

$P(4/y)$: $y = -\frac{1}{2} \cdot 4^2 + 6 \cdot 4 - 10$

$= -8 + 24 - 10 = 6$ $\quad P(4/6)$

$Q(x/8)$: $-\frac{1}{2}x^2 + 6x - 10 = 8 \quad | \cdot (-2)$

$x^2 - 12x + 20 = -16 \quad | + 16$

$x^2 - 12x + 36 = 0$

$(x-6)^2 = 0$

$\Rightarrow x = 6$ $\quad Q(6/8)$

(3) $\frac{5}{2}x+1=-\frac{1}{8}x^2+\frac{3}{2}x+\frac{7}{2} \quad / \cdot 8$

$20x+8=-x^2+12x+28$

$x^2+8x-20=0$

$(x-2)(x+10)=0$

$x-2=0 \quad$ oder $\quad x+10=0$

$x_1=2 \qquad x_2=-10$

$y_1=\frac{5}{2}\cdot 2+1 \qquad y_2=-25+1=-24$

$=6$

$\underline{P_1(2/6)} \qquad \underline{P_2(-10/-24)}$

(4) $-\frac{1}{4}x^2+3x+4=0 \quad / \cdot(-4)$

$x^2-12x-16=0$

$x_{1,2}=\frac{12\pm\sqrt{12^2-4\cdot 1\cdot(-16)}}{2}$

$=\frac{12\pm\sqrt{144+64}}{2}=\frac{12\pm\sqrt{208}}{2}$

$=\frac{12\pm\sqrt{208}}{2}$ $\qquad 208=2^4\cdot 13$

$=\frac{12\pm\sqrt{208}}{2}=\frac{12\pm\sqrt{2^4\cdot 13}}{2}$

$=\frac{12\pm 4\cdot\sqrt{13}}{2}=\underline{6\pm 2\sqrt{13}}$

$\underline{x_1=-1.211}$

$\underline{x_2=13.211}$

(5) $-x^2+8x-10=\frac{1}{5}x^2+\frac{4}{5}x-\frac{26}{5} \quad /\cdot 5$

$-5x^2+40x-50=x^2+4x-26$

$0=6x^2-36x+24 \quad /:6$

$x^2-6x+4=0$

$x_{1,2}=\frac{6\pm\sqrt{6^2-4\cdot 1\cdot 4}}{2}=\frac{6\pm\sqrt{20}}{2}$

$=\frac{6\pm\sqrt{4\cdot 5}}{2}=\frac{6\pm 2\sqrt{5}}{2}=3\pm\sqrt{5}$

$x_1=5.236 \qquad x_2=0.764$