① (1) $f(x) = \dfrac{2x+1}{x-3}$

CE: $x - 3 \neq 0$
$x \neq 3$

dom : $\mathbb{R} \setminus \{3\}$

(2) $f(x) = \dfrac{1}{2x^2 - 6x - 8}$

CE: $2x^2 - 6x - 8 \neq 0$

$\Delta = 6^2 - 4 \cdot 2 \cdot (-8) = 36 + 64 = 100$

$\begin{array}{c} x_1 \\ x_2 \end{array} \Big\rangle \dfrac{6 \pm 10}{4} \Big\langle \begin{array}{c} 4 \\ -1 \end{array}$

dom : $\mathbb{R} \setminus \{-1 ; 4\}$

(3) $f(x) = \sqrt{3x - 7}$

CE: $3x - 7 \geq 0$
$3x \geq 7$
$x \geq \dfrac{7}{3}$

dom : $\left[\dfrac{7}{3} ; +\infty\right[$

(4) $f(x) = \sqrt{x^2 - x - 2}$

CE: $x^2 - x - 2 \geq 0$

$\Delta = (-1)^2 - 4 \cdot 1 \cdot (-2) = 1 + 8 = 9$

$\begin{array}{c} x_1 \\ x_2 \end{array} \Big\rangle \dfrac{1 \pm 3}{2} \Big\langle \begin{array}{c} 2 \\ -1 \end{array}$

x		-1		2	
$x^2 - x - 2$	$+$	0	$-$	0	$+$

$x \leq -1$ ou $x \geq 2$

dom : $]-\infty ; -1] \cup [2 ; +\infty[$

(5) $f(x) = \sqrt[5]{3x^6 + 2x^4 - 3x + 7}$

CE: /

dom : $\mathbb{R}$

(6) $f(x) = \dfrac{\sqrt{x+1}}{x - 2}$

CE: • $x - 2 \neq 0$ • $x + 1 \geq 0$
   $x \neq 2$ $x \geq -1$

dom : $[-1 ; +\infty[\setminus \{2\}$

(7) $f(x) = \sqrt{\dfrac{x+1}{x-2}}$

CE: $\dfrac{x+1}{x-2} \geq 0$

$x + 1 = 0 \; (\Leftrightarrow) \; x = -1$
$x - 2 = 0 \; (\Leftrightarrow) \; x = 2$

x		-1		2	
$x+1$	$-$	0	$+$	$+$	$+$
$x-2$	$-$	$-$	$-$	0	$+$
	$+$	0	$-$	$\not\vert$	$+$

$x \leq -1$ ou $x > 2$

dom : $]-\infty ; -1] \cup]2 ; +\infty[$

(8) $f(x) = \dfrac{\sqrt{x+1}}{\sqrt{x-2}}$

CE: • $x + 1 \geq 0$ • $x - 2 > 0$
   $x \geq -1$ $x > 2$

dom : $]2 ; +\infty[$

(9) $f(x) = \dfrac{x+1}{\sqrt{x-2}}$

CE: $x - 2 > 0$
$x > 2$

dom : $]2 ; +\infty[$

(10) $f(x) = \dfrac{x+1}{x-2}$

CE: $x - 2 \neq 0$
$x \neq 2$

dom : $\mathbb{R} \setminus \{2\}$

(11) $f(x) = \sqrt{(3x-1)(2x-5)}$

CE: $(3x-1)(2x-5) \geq 0$

$3x-1 = 0 \iff 3x = 1 \iff x = \frac{1}{3}$

$2x-5 = 0 \iff 2x = 5 \iff x = \frac{5}{2}$

x		$1/3$		$5/2$	
$3x-1$	$-$	0	$+$	$+$	$+$
$2x-5$	$-$	$-$	$-$	0	$+$
	$+$	0	$-$	0	$+$

$x \leq \frac{1}{3}$ ou $x \geq \frac{5}{2}$

dom: $]-\infty; \frac{1}{3}] \cup [\frac{5}{2}; +\infty[$

(12) $f(x) = 3x^2 - 5x + 1$

CE: /

dom: $\mathbb{R}$

② (1) $P(x) = 7x - 1$

/

(2) $P(x) = -4x^2 + 3x + 1$

racines: $\Delta = 3^2 - 4 \cdot (-4) \cdot 1 = 9 + 16 = 25$

$\begin{matrix} x_1 \\ x_2 \end{matrix} \searrow \dfrac{-3 \pm 5}{-8} \begin{matrix} -1/4 \\ 1 \end{matrix}$

fact: $P(x) = -4 \cdot (x + \frac{1}{4})(x - 1)$

(3) $P(x) = x^2 - 4x + 4$

⚠ Produit remarquable!

$P(x) = (x - 2)^2$

(4) $P(x) = x^4 - x^3 + 5x^2 - 5x$

$= x \underbrace{(x^3 - x^2 + 5x - 5)}_{Q(x)}$

racines: $div(-5) = \{\pm 1; \pm 5\}$

$Q(1) = 1^3 - 1^2 + 5 \cdot 1 - 5 = 0$

	1	-1	5	-5
1	$\downarrow$	1	0	5
	1	0	5	0

fact: $Q(x) = (x-1)\underbrace{(x^2 + 5)}_{R(x)}$

racines: $x^2 + 5 = 0$

$x^2 = -5$

jamais

fact: /

TOTAL: $P(x) = x(x-1)(x^2 + 5)$

(5) $P(x) = x^3 - 2x^2 - 5x + 6$

racines: $div(6) = \{\pm 1; \pm 2; \pm 3; \pm 6\}$

$P(1) = 1^3 - 2 \cdot 1^2 - 5 \cdot 1 + 6 = 0$

fact:

	1	-2	-5	6
1	$\downarrow$	1	-1	-6
	1	-1	-6	0

$P(x) = (x-1)\underbrace{(x^2 - x - 6)}_{R(x)}$

racines: $x^2 - x - 6 = 0$

$\Delta = (-1)^2 - 4 \cdot 1 \cdot (-6)$

$= 1 + 24$

$= 25$

$\begin{matrix} x_1 \\ x_2 \end{matrix} \searrow \dfrac{1 \pm 5}{2} \begin{matrix} 3 \\ -2 \end{matrix}$

fact: $R(x) = 1 \cdot (x - 3)(x + 2)$

TOTAL: $P(x) = (x-1)(x-3)(x+2)$