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① a) $\frac{3x}{x^2-1}$ is a rational Expression b) $\frac{\sqrt{x+1}}{2x+3}$ is not a rational expression ($\sqrt{x+1}$ is not a polynomial) c) $\frac{x(x^2-1)}{x+3}$ is a rational expression

② numerator and denominator $\frac{(x+1)(x+2)}{(x+3)(x+2)} = \boxed{\frac{x+1}{x+3}}$

③ numerators, denominators

$$\frac{2}{x+1} \cdot \frac{x}{x+3} = \boxed{\frac{2x}{(x+1)(x+3)}} \text{ or } \frac{2x}{x^2+4x+3}$$

④ $\boxed{\frac{1}{x} - \frac{2}{x+1} - \frac{x}{(x+1)^2}}$ ⓐ 3 ⓑ $\boxed{x(x+1)^2}$, ⓒ ~~$\frac{1}{x} - \frac{2}{x+1} - \frac{x}{(x+1)^2}$~~

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

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

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

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

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

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(5) $4x^2 - 10x + 3$

D: $\{x \mid x \in \mathbb{R}\}$

(6) $-x^4 + x^3 + 9x$

D: $\{x \mid x \in \mathbb{R}\}$

(8) $\frac{2t^2 - 5}{3t + 6}$ D: $3t + 6 \neq 0$

$3t \neq -6$

$t \neq -2$

D: $\{t \mid t \neq 2\}$

(9) $\sqrt{x+3}$ D: $x + 3 \geq 0$

$x \geq -3$

D: $\{x \mid x \geq -3\}$

(10) $\frac{1}{\sqrt{x-1}}$ D: $x - 1 \geq 0$

$x \geq 1$

D: $\{x \mid x \geq 1\}$

(11) $\frac{x^2 + 1}{x^2 - x - 2}$ D: $x^2 - x - 2 \neq 0$

$(x-2)(x+1) \neq 0$

$x - 2 \neq 0$ and $x + 1 \neq 0$

$x \neq 2$ and $x \neq -1$

D: $\{x \mid x \neq -1 \text{ and } x \neq 2\}$

(12) $\frac{\sqrt{2x}}{x+1}$ D: $2x \geq 0$ and $x + 1 \neq 0$ so $x \geq 0$ and $x \neq -1$

D: $\{x \mid x \geq 0\}$

(13) $\frac{3(x+2)(x-1)}{6(x-1)^2}$ D: $x - 1 \neq 0$

$x \neq 1$

D: $\{x \mid x \neq 1\}$

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(14) $$\frac{4(x^2-1)}{12(x+2)(x-1)} = \frac{4(x-1)(x+1)}{12(x+2)(x-1)}$$

$$= \boxed{\frac{(x+1)}{3(x+2)}}$$

(15) $$\frac{x-2}{x^2-4} = \frac{x-2}{(x-2)(x+2)}$$

$$= \boxed{\frac{1}{x+2}}$$

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

$$= \boxed{\frac{x-2}{x-1}}$$

(17) $$\frac{x^2+6x+8}{x^2+5x+4} = \frac{(x+4)(x+2)}{(x+4)(x+1)}$$

$$= \boxed{\frac{(x+2)}{(x+1)}}$$

(18) $$\frac{x^2-x-12}{x^2+5x+6} = \frac{(x+3)(x-4)}{(x+3)(x+2)}$$

$$= \boxed{\frac{x-4}{x+2}}$$

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(19)

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

$$= \boxed{\frac{y}{y-1}}$$

(20)

$$\frac{y^2-3y-18}{2y^2+5y+3} = \boxed{\frac{(y-6)(y+3)}{(2y+3)(y+1)}}$$

(21)

$$\frac{2x^3-x^2-6x}{2x^2-7x+6} = \frac{x(2x^2-x-6)}{(2x-3)(x-2)}$$

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

$$= \boxed{\frac{x(2x+3)}{(2x-3)}}$$

(22)

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

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

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

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(23) $$\frac{4x}{x^2-4} \cdot \frac{x+2}{16x} = \frac{(4x)(x+2)}{(x+2)(x-2)(16x)}$$

$$= \boxed{\frac{1}{4(x-2)}}$$

(24) $$\frac{x^2-25}{x^2-16} \cdot \frac{x+4}{x+5} = \frac{(x-5)(x+5)(x+4)}{(x-4)(x+4)(x+5)}$$

$$= \boxed{\frac{x-5}{x-4}}$$

(25) $$\frac{x^2-2x-15}{x^2-9} \cdot \frac{x+3}{x-5} = \frac{(x-5)(x+3)(x+3)}{(x-3)(x+3)(x-5)}$$

$$= \boxed{\frac{x+3}{x-3}}$$

(26) $$\frac{x^2+2x-3}{x^2-2x-3} \cdot \frac{3-x}{3+x}$$

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

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

$$= \boxed{\frac{-(x-1)}{x+1}}$$

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(27) $\dfrac{t-3}{t^2+9} \cdot \dfrac{t+3}{t^2-9} = \dfrac{(t-3)(t+3)}{(t^2+9)(t-3)(t+3)}$

$= \boxed{\dfrac{1}{t^2+9}}$

(28) $\dfrac{x^2-x-6}{x^2+2x} \cdot \dfrac{x^3+x^2}{x^2-2x-3} = \dfrac{(x-3)(x+2) \cdot x^2(x+1)}{x(x+2)(x-3)(x+1)}$

$= \boxed{x}$

(29) $\dfrac{x^2+7x+12}{x^2+3x+2} \cdot \dfrac{x^2+5x+6}{x^2+6x+9}$

$= \dfrac{(x+4)(x+3)(x+3)(x+2)}{(x+2)(x+1)(x+3)(x+3)}$

$= \boxed{\dfrac{x+4}{x+1}}$

(30) $\dfrac{x^2+2xy+y^2}{x^2-y^2} \cdot \dfrac{2x^2-xy-y^2}{x^2-xy-2y^2}$

$= \dfrac{(x+y)^2(2x+y)(x-y)}{(x-y)(x+y)(x-2y)(x+y)}$

$= \boxed{\dfrac{(x+y)(2x+y)}{(x+4)(x-2y)}}$

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(31) $\frac{x+3}{4x^2-9} \div \frac{x^2+7x+12}{2x^2+7x-15} = \frac{x+3}{(2x-3)(2x+3)} \cdot \frac{2x^2+7x-15}{x^2+7x+12}$

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

$= \boxed{\frac{(x+5)}{(2x+3)(x+4)}}$

(32) $\frac{2x+1}{2x^2+x-15} \div \frac{6x^2-x-2}{x+3}$

$= \frac{2x+1}{(2x-5)(x+3)} \cdot \frac{x+3}{6x^2-x-2}$

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

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

(33) $\frac{2x^2+3x+1}{x^2+2x-15} \div \frac{x^2+6x+5}{2x^2-7x+3}$

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

$= \boxed{\frac{(2x+1)(2x-1)}{(x+5)^2}}$

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(34) $$\frac{4y^2-9}{2y^2+9y-18} \div \frac{2y^2+y-3}{y^2+5y-6}$$

$$= \frac{(2y-3)(2y+3)}{(2y-3)(y+6)} \cdot \frac{(y+6)(y-1)}{(2y+3)(y-1)}$$

$$= \boxed{1}$$

(35) $$\frac{\frac{x^3}{x+1}}{\frac{x}{x^2+2x+1}} = \frac{x^3}{x+1} \cdot \frac{x^2+2x+1}{x}$$

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

$$= \boxed{x^2(x+1)}$$

(36) $$\frac{\frac{2x^2-3x-2}{x^2-1}}{\frac{2x^2+5x+2}{x^2+x-2}} = \frac{(2x+1)(x-2)}{(x-1)(x+1)} \cdot \frac{x^2+x-2}{2x^2+5x+2}$$

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

$$= \boxed{\frac{x-2}{x+1}}$$

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p41 (37) $\dfrac{\frac{x}{y}}{z} = \dfrac{x}{y} \cdot \dfrac{1}{z}$

$= \boxed{\dfrac{x}{yz}}$

(38) $\dfrac{x}{\frac{y}{z}} = x\left(\dfrac{z}{y}\right)$

$= \boxed{\dfrac{xz}{y}}$

(39) $2\left(\dfrac{x-3}{x-3}\right) + \dfrac{x}{x-3} = \dfrac{2x-6}{x-3} + \dfrac{x}{x-3}$

$= \boxed{\dfrac{3x-6}{x-3}}$

(40) $\dfrac{2x-1}{x+4} - 1\left(\dfrac{x+4}{x+4}\right) = \dfrac{2x-1}{x+4} - \dfrac{x+4}{x+4}$

$= \dfrac{2x-1-x-4}{x+4}$

$= \boxed{\dfrac{x-5}{x+4}}$

(41) $\dfrac{1}{x+5}\left(\dfrac{x-3}{x-3}\right) + \dfrac{2}{x-3}\left(\dfrac{x+5}{x+5}\right)$

$= \dfrac{x-3+2x+10}{(x+5)(x-3)}$

$= \boxed{\dfrac{3x+7}{(x-3)(x+5)}}$

(42) $\dfrac{1}{x+1}\left(\dfrac{x-1}{x-1}\right) + \dfrac{1}{x-1}\left(\dfrac{x+1}{x+1}\right)$

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

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

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(43) $\frac{1}{(x+1)}\left(\frac{x+2}{x+2}\right) - \frac{1}{(x+2)}\left(\frac{x+1}{x+1}\right)$

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

$= \boxed{\frac{1}{(x+1)(x+2)}}$

(44) $\frac{x}{(x-4)}\left(\frac{x+6}{x+6}\right) - \frac{3}{(x+6)}\left(\frac{x-4}{x-4}\right)$

$= \frac{x^2+6x - 3x+12}{(x-4)(x+6)}$

$= \boxed{\frac{x^2+3x+12}{(x-4)(x+6)}}$

(45) $\frac{x}{(x+1)^2} + \frac{2}{(x+1)}\left(\frac{x+1}{x+1}\right)$

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

$= \boxed{\frac{3x+2}{(x+1)^2}}$

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(46) $\frac{5}{(2x-3)}\left(\frac{2x-3}{2x-3}\right) - \frac{3}{(2x-3)^2}$

$= \frac{10x-15-3}{(2x-3)^2} = \frac{10x-18}{(2x-3)^2}$

$= \boxed{\frac{2(5x-9)}{(2x-3)^2}}$

(47) $(u+1)\left(\frac{u+1}{u+1}\right) + \frac{u}{u+1}$

$= \frac{u^2+2u+1+u}{u+1}$

$= \boxed{\frac{u^2+3u+1}{u+1}}$

(48) $\frac{2}{a^2}\left(\frac{b^2}{b^2}\right) - \frac{3}{ab}\left(\frac{ab}{ab}\right) + \frac{4}{b^2}\left(\frac{a^2}{a^2}\right)$

$= \boxed{\frac{2b^2-3ab+4a^2}{a^2b^2}}$

(49) $\frac{1}{x^2} + \frac{1}{x^2+x} = \frac{1}{x^2}\left[\frac{x+1}{x+1}\right] + \frac{1}{x(x+1)}\left[\frac{x}{x}\right]$

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

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

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(50) $\frac{1}{x}\left(\frac{x^2}{x^2}\right) + \frac{1}{x^2}\left(\frac{x}{x}\right) + \frac{1}{x^3} = \boxed{\frac{x^2+x+1}{x^3}}$

(51) $\frac{2}{x+3} - \frac{1}{x^2+7x+12}$

$= \frac{2}{(x+3)}\frac{[x+4]}{[x+4]} - \frac{1}{(x+3)(x+4)}$

$= \frac{2x+8-1}{(x+3)(x+4)} = \boxed{\frac{2x+7}{(x+3)(x+4)}}$

(52) $\frac{x}{x^2-4} + \frac{1}{x-2} = \frac{x}{(x-2)(x+2)} + \frac{1}{(x-2)}\frac{[x+2]}{[x+2]}$

$= \frac{x+x+2}{(x-2)(x+2)} = \boxed{\frac{2x+2}{(x-2)(x+2)}}$ or

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

(53) $\frac{1}{x+3} + \frac{1}{x^2-9}$

$= \frac{1}{(x+3)}\frac{[x-3]}{[x-3]} + \frac{1}{(x+3)(x-3)}$

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

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(54) $\dfrac{x}{x^2+x-2} - \dfrac{2}{x^2-5x+4}$

$= \dfrac{x}{(x+2)(x-1)}\dfrac{[x-4]}{[x-4]} - \dfrac{2}{(x-1)(x-4)}\dfrac{[x+2]}{[x+2]}$

$= \dfrac{x^2-4x-2x-4}{(x+2)(x-1)(x-4)} = \boxed{\dfrac{x^2-6x-4}{(x+2)(x-1)(x-4)}}$

(55) $\dfrac{2}{x} + \dfrac{3}{x-1} - \dfrac{4}{x^2-x}$

$= \dfrac{2}{x}\dfrac{[x-1]}{[x-1]} + \dfrac{3}{x-1}\left[\dfrac{x}{x}\right] - \dfrac{4}{x(x-1)}$

$= \dfrac{2x-2+3x-4}{x(x-1)} = \dfrac{5x-6}{x(x-1)}$

(56) $\dfrac{x}{x^2-x-6} - \dfrac{1}{x+2} - \dfrac{2}{x-3}$

$= \dfrac{x}{(x-3)(x+2)} - \dfrac{1}{x+2}\left[\dfrac{x-3}{x-3}\right] - \dfrac{2}{x-3}\left[\dfrac{x+2}{x+2}\right]$

$= \dfrac{x-x+3-2x-4}{(x-3)(x+2)}$

$= \boxed{\dfrac{-2x-1}{(x-3)(x+2)} \text{ or } -\dfrac{(2x+1)}{(x-3)(x+2)}}$

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(57) $\dfrac{1}{x^2+3x+2} - \dfrac{1}{x^2-2x-3}$

$= \dfrac{1}{(x+1)(x+2)}\left[\dfrac{x-3}{x-3}\right] - \dfrac{1}{(x-3)(x+1)}\left[\dfrac{x+2}{x+2}\right]$

$= \dfrac{x-3-x-2}{(x+1)(x+2)(x-3)} = \boxed{\dfrac{-5}{(x+1)(x+2)(x-3)}}$

(58) $\dfrac{1}{x+1} - \dfrac{2}{(x+1)^2} + \dfrac{3}{x^2-1}$

$\dfrac{1}{x+1}\left[\dfrac{(x-1)(x+1)}{(x-1)(x+1)}\right] - \dfrac{2}{(x+1)^2}\left[\dfrac{x-1}{x-1}\right] + \left[\dfrac{x+1}{x+1}\right]\dfrac{3}{(x-1)(x+1)}$

$= \dfrac{x^2-1-2x+2+3x+3}{(x+1)(x-1)(x+1)}$

$= \boxed{\dfrac{x^2+x+4}{(x+1)^2(x-1)}}$

(59) $\left(\dfrac{x+\dfrac{1}{x+2}}{x-\dfrac{1}{x+2}}\right)\left[\dfrac{x+2}{x+2}\right] = \dfrac{x^2+2x+1}{x^2+2x-1}$

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(60) $\dfrac{[c-1]}{[c-1]}\left(\dfrac{1+\frac{1}{c-1}}{1-\frac{1}{c-1}}\right)$ note: $c \neq 1$

$= \dfrac{c-1+1}{c-1-1}$ Note: $c \neq 0$

$= 1$

(61) $\dfrac{\frac{x+2}{x-1} - \frac{x-3}{x-2}}{x+2}$ $\left[\dfrac{(x-1)(x-2)}{(x-1)(x-2)}\right]$

$= \dfrac{(x+2)(x-2) - (x-3)(x-1)}{(x+2)(x-1)(x-2)}$

$= \dfrac{x^2-4 - [x^2-4x+3]}{(x+2)(x-1)(x-2)}$

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

$= \dfrac{4x-7}{(x+2)(x-1)(x-2)}$

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(62)
$$\frac{(x-4)(x+1)}{(x-4)(x+1)}\left(\frac{\frac{x-3}{x-4}-\frac{x+2}{x+1}}{x+3}\right)$$

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

$$=\frac{x^2-2x-3-x^2+2x+8}{(x-4)(x+1)(x+3)}$$

$$=\boxed{\frac{5}{(x-4)(x+1)(x+3)}}$$

(63)
$$\frac{x^2y^2}{x^2y^2}\left(\frac{\frac{x}{y}-\frac{y}{x}}{\frac{1}{x^2}-\frac{1}{y^2}}\right)=\frac{x^3y-xy^3}{y^2-x^2}$$

$$=\frac{xy(x^2-y^2)}{-(x^2-y^2)}$$

$$=\frac{(xy)(x-y)(x+y)}{-(x-y)(x+y)}$$

$$=\frac{xy}{-1}$$

$$=\boxed{-xy}$$

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(64) $$x - \frac{y}{\left(\frac{x}{y} + \frac{y}{x}\right)}\left[\frac{xy}{xy}\right]$$

$$= x\left[\frac{x^2+y^2}{x^2+y^2}\right] - \frac{xy^2}{x^2+y^2}$$

$$= \frac{x^3 + xy^2 - xy^2}{x^2+y^2}$$

$$= \boxed{\frac{x^3}{x^2+y^2}}$$

(65) $$\frac{x^{-2} - y^{-2}}{x^{-1} + y^{-1}}\left(\frac{x^2y^2}{x^2y^2}\right)$$

$$= \frac{y^2 - x^2}{xy^2 + x^2y} = \frac{(y-x)(y+x)}{xy(y+x)}$$

$$= \boxed{\frac{y-x}{xy} \text{ or } -\frac{(x-y)}{xy}}$$

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p42 * (66) $\dfrac{x^{-1}+y^{-1}}{(x+y)^{-1}}\left(\dfrac{xy(x+y)}{xy(x+y)}\right)$

$= \dfrac{y(x+y)+x(x+y)}{xy}$

$= \boxed{\dfrac{(x+y)(y+x)}{xy}}$ or $\dfrac{(x+y)(x+y)}{xy}$ or $\dfrac{(x+y)^2}{xy}$

(67) $1 - \dfrac{1}{1-\frac{1}{x}}\left[\dfrac{x}{x}\right]$

$\left[\dfrac{x-1}{x-1}\right](1) - \dfrac{x}{x-1}$

$= \dfrac{x-1-x}{x-1} = \boxed{\dfrac{-1}{x-1}}$

* quiz

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(68)

$$1 + \frac{1}{1 + \frac{1}{1+x}} \left[\frac{1+x}{1+x} \right]$$

$$= 1 + \frac{1+x}{1+x+1}$$

$$= 1 \left[\frac{x+2}{x+2} \right] + \frac{x+1}{x+2}$$

$$= \frac{x+2+x+1}{x+2}$$

$$= \boxed{\frac{2x+3}{x+2}}$$

(69)

$$\frac{\frac{1}{1+x+h} - \frac{1}{1+x}}{h} \left[\frac{(1+x+h)(1+x)(h)}{(1+x+h)(1+x)(h)} \right]$$

$$= \frac{(1+x)(h) - (1+x+h)(1+x)(h)}{h(1+x+h)(1+x)(h)}$$

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$$= \frac{h\left[(1+x) - (1+x+h)(1+x)\right]}{h(1+x+h)(1+x)(h)}$$

$$= \frac{1+x - \left[1+x+x+x^2+h+xh\right]}{h(x+1+h)(x+1)}$$

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

$$= \frac{-x(x+1) - h(x+1)}{h(x+1+h)(x+1)}$$

$$\frac{(x+1)(-x-h)}{h(x+1+h)(x+1)} = \frac{-(x+h)}{h(x+1+h)}$$

(69)

(69) $\dfrac{\dfrac{1}{1+x+h}-\dfrac{1}{1+x}}{h} = \dfrac{\dfrac{1}{h(1+x+h)}-\dfrac{1}{h(1+x)}}{}$

$= \left[\dfrac{1+x}{1+x}\right]\dfrac{1}{h(1+x+h)} - \left[\dfrac{(1+x+h)}{(1+x+h)}\right]\dfrac{1}{h(1+x)}$

$= \dfrac{1+x-1-x-h}{h(1+x)(1+x+h)}$

$= \dfrac{-h}{h(1+x)(1+x+h)}$

$= \dfrac{-1}{(1+x)(1+x+h)}$

(71) $\dfrac{\dfrac{1}{(x+h)^2}-\dfrac{1}{x^2}}{h} = \left[\dfrac{x^2}{x^2}\right]\dfrac{1}{h(x+h)^2} - \dfrac{1}{x^2}\left[\dfrac{h(x+h)^2}{h(x+h)^2}\right]$

$= \dfrac{x^2-h(x+h)^2}{(x^2)(h)(x+h)^2}$

(70) $\dfrac{\dfrac{1}{\sqrt{x+h}}-\dfrac{1}{\sqrt{x}}}{h} = \left[\dfrac{\sqrt{x}}{\sqrt{x}}\right]\dfrac{1}{h(\sqrt{x+h})} - \dfrac{1}{h\sqrt{x}}\left[\dfrac{\sqrt{x+h}}{\sqrt{x+h}}\right]$

$= \dfrac{\sqrt{x}-\sqrt{x+h}}{\sqrt{x}(h)(\sqrt{x+h})}\left[\dfrac{\sqrt{x}+\sqrt{x+h}}{\sqrt{x}+\sqrt{x+h}}\right]$

$= \dfrac{x-(x+h)}{\sqrt{x}(h)(\sqrt{x+h})(\sqrt{x}+\sqrt{x+h})}$

$= \dfrac{-h}{h(\sqrt{x})(\sqrt{x+h})(\sqrt{x}+\sqrt{x+h})}$

$= \left[\dfrac{-1}{(\sqrt{x})(\sqrt{x+h})(\sqrt{x}+\sqrt{x+h})}\right]$

(20)

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(72) $$\frac{(x+h)^3 - 7(x+h) - (x^3 - 7x)}{h}$$

$$= \frac{(x^2+2xh+h^2)(x+h) - 7x - 7h - x^3 + 7x}{h}$$

$$= \frac{x^3 + 2x^2h + xh^2 + x^2h + 2xh^2 + h^3 - 7h - x^3}{h}$$

$$= \frac{3x^2h + 3xh^2 + h^3 - 7h}{h}$$

$$= \frac{h(3x^2 + 3xh + h^2 - 7)}{h}$$

$$= \boxed{3x^2 + 3xh + h^2 - 7}$$

(73) $$\sqrt{1 + \left(\frac{x}{\sqrt{1-x^2}}\right)^2} = \sqrt{1 + \frac{x^2}{1-x^2}}$$

$$= \sqrt{\frac{1-x^2}{1-x^2} + \frac{x^2}{1-x^2}}$$

$$= \sqrt{\frac{1}{1-x^2}}$$

$$= \frac{\sqrt{1}}{\sqrt{1-x^2}}$$

$$= \frac{1}{\sqrt{1-x^2}} \left(\frac{\sqrt{1-x^2}}{\sqrt{1-x^2}}\right)$$

$$= \boxed{\frac{\sqrt{1-x^2}}{1-x^2}}$$

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(74) $\sqrt{1+\left(x^3-\frac{1}{4x^3}\right)^2} = \sqrt{1+x^6-\frac{2x^3}{4x^3}+\frac{1}{16x^6}}$

$= \sqrt{1+x^6-\frac{1}{2}+\frac{1}{16x^6}}$

$= \sqrt{x^6+\frac{1}{2}+\frac{1}{16x^6}}$

$= \sqrt{\left(x^3+\frac{1}{4x^3}\right)^2}$

$= \left|x^3+\frac{1}{4x^3}\right|$

(75) $\frac{3(x+2)^2(x-3)^2-(x+2)^3(2)(x-3)}{(x-3)^4}$

$= \frac{(x+2)^2(x-3)\left[3(x-3)-(x+2)(2)\right]}{(x-3)^4}$

$= \frac{(x+2)^2\left[3x-9-2x-4\right]}{(x-3)^3}$

$= \boxed{\frac{(x+2)^2\left[x-13\right]}{(x-3)^3}}$

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(76) $$\frac{2x(x+6)^4 - x^2(4)(x+6)^3}{(x+6)^8}$$

$$= \frac{2x(x+6)^3\left[(x+6) - 2x\right]}{(x+6)^8}$$

$$= \boxed{\frac{2x\left[-x+6\right]}{(x+6)^5} \quad \text{or} \quad = \frac{2x(6-x)}{(x+6)^5}}$$

(77) $$\frac{2(1+x)^{\frac{1}{2}} - x(1+x)^{-\frac{1}{2}}}{x+1} = \frac{(1+x)^{-\frac{1}{2}}\left[2(1+x) - x\right]}{1+x}$$

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

$$= \boxed{\frac{x+2}{(1+x)^{\frac{3}{2}}}}$$

(78) $$\frac{(1-x^2)^{\frac{1}{2}} + x^2(1-x^2)^{-\frac{1}{2}}}{1-x^2} = \frac{(1-x^2)^{-\frac{1}{2}}\left[(1-x^2) + x^2\right]}{1-x^2}$$

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

$$= \boxed{\frac{1}{(1-x^2)^{\frac{3}{2}}}}$$

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(79) $$\frac{3(1+x)^{\frac{1}{3}} - x(1+x)^{-\frac{2}{3}}}{(1+x)^{\frac{2}{3}}}$$

$$= \frac{(1+x)^{-\frac{2}{3}}\left[3(1+x) - x\right]}{(1+x)^{\frac{2}{3}}}$$

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

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

(80) $$\frac{(7-3x)^{\frac{1}{2}} + \frac{3}{2}x(7-3x)^{-\frac{1}{2}}}{(7-3x)}$$

$$= \frac{(7-3x)^{-\frac{1}{2}}\left[(7-3x) + \frac{3}{2}x\right]}{(7-3x)}$$

$$= \boxed{\frac{7-\frac{3}{2}x}{(7-3x)^{\frac{3}{2}}}}$$

1.4

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(81) $\frac{1}{2-\sqrt{3}}\left[\frac{2+\sqrt{3}}{2+\sqrt{3}}\right] = \frac{2+\sqrt{3}}{4-3}$

$= \boxed{2+\sqrt{3}}$

(82) $\frac{2}{3-\sqrt{5}}\left[\frac{3+\sqrt{5}}{3+\sqrt{5}}\right] = \frac{6+2\sqrt{5}}{9-5}$

$= \frac{6+2\sqrt{5}}{4}$

$= \frac{2(3+\sqrt{5})}{2 \cdot 2}$

$= \boxed{\frac{3+\sqrt{5}}{2}}$

(83) $\frac{2}{\sqrt{2}+\sqrt{7}}\left[\frac{\sqrt{2}-\sqrt{7}}{\sqrt{2}-\sqrt{7}}\right] = \frac{2(\sqrt{2}-\sqrt{7})}{2-7}$

$= \frac{2(\sqrt{2}-\sqrt{7})}{-5}$

$= \frac{-2(\sqrt{2}-\sqrt{7})}{5}$

$= \boxed{\frac{2(\sqrt{7}-\sqrt{2})}{5}}$

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(84) $\dfrac{1}{\sqrt{x}+1}\left[\dfrac{\sqrt{x}-1}{\sqrt{x}-1}\right] = \boxed{\dfrac{\sqrt{x}-1}{x-1}}$

(85) $\dfrac{y}{(\sqrt{3}+\sqrt{y})}\left[\dfrac{\sqrt{3}-\sqrt{y}}{\sqrt{3}-\sqrt{y}}\right] = \boxed{\dfrac{y(\sqrt{3}-\sqrt{y})}{3-y}}$

(86) $\dfrac{2(x-y)}{\sqrt{x}-\sqrt{y}}\left[\dfrac{\sqrt{x}+\sqrt{y}}{\sqrt{x}+\sqrt{y}}\right] = \dfrac{2(x-y)(\sqrt{x}+\sqrt{y})}{(x-y)}$

$= \boxed{2(\sqrt{x}+\sqrt{y})}$

(87) $\dfrac{1-\sqrt{5}}{3}\left[\dfrac{1+\sqrt{5}}{1+\sqrt{5}}\right] = \dfrac{1-5}{3(1+\sqrt{5})}$

$= \boxed{\dfrac{-4}{3(1+\sqrt{5})}}$

(88) $\dfrac{\sqrt{3}+\sqrt{5}}{2}\left[\dfrac{\sqrt{3}-\sqrt{5}}{\sqrt{3}-\sqrt{5}}\right] = \dfrac{3-5}{2[\sqrt{3}-\sqrt{5}]}$

$= \dfrac{-2}{2(\sqrt{3}-\sqrt{5})}$

$= \boxed{\dfrac{-1}{\sqrt{3}-\sqrt{5}}}$

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(89) $\dfrac{\sqrt{r}+\sqrt{2}}{5}\left[\dfrac{\sqrt{r}-\sqrt{2}}{\sqrt{r}\cdot\sqrt{2}}\right] = \boxed{\dfrac{r+2}{5\left[\sqrt{r}-\sqrt{2}\right]}}$

(90) $\dfrac{\sqrt{x}-\sqrt{x+h}}{h\sqrt{x}\sqrt{x+h}}\left[\dfrac{\sqrt{x}+\sqrt{x+h}}{\sqrt{x}+\sqrt{x+h}}\right]$

$= \dfrac{x-(x+h)}{hx\sqrt{x+h}+h\sqrt{x}(x+h)} = \dfrac{-h}{h\sqrt{x}\sqrt{x+h}\left(\sqrt{x}+\sqrt{x+h}\right)}$

$= \boxed{\dfrac{-1}{\sqrt{x}\sqrt{x+h}\left(\sqrt{x}+\sqrt{x+h}\right)}}$

(91) $\dfrac{\left(\sqrt{x^2+1}-x\right)}{1}\left[\dfrac{\sqrt{x^2+1}-x}{\sqrt{x^2+1}-x}\right]$

$= \dfrac{x^2+1-x^2}{\sqrt{x^2+1}-x}$

$= \boxed{\dfrac{1}{\sqrt{x^2+1}-x}}$

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(92) $\dfrac{\sqrt{x+1}-\sqrt{x}}{1}\left[\dfrac{\sqrt{x+1}+\sqrt{x}}{\sqrt{x+1}+\sqrt{x}}\right]$

$= \dfrac{x+1-x}{\sqrt{x+1}+\sqrt{x}} = \boxed{\dfrac{1}{\sqrt{x+1}+\sqrt{x}}}$

(93) $\dfrac{16+9}{16}$ [T]

$= \dfrac{16}{16}+\dfrac{9}{16}$

(94) [F] $1-\dfrac{b}{c} = \dfrac{c}{c}-\dfrac{b}{c}$

$= \dfrac{c-b}{c}$

(95) [F] (96) [F] (97) [F] (98) [F]

(99) [T] (100) [T]

(101) $R = \dfrac{1}{\frac{1}{R_1}+\frac{1}{R_2}}$

a) $\dfrac{1}{\frac{1}{R_1}+\frac{1}{R_2}}\left[\dfrac{R_1R_2}{R_1R_2}\right]$

$= \dfrac{R_1R_2}{R_2+R_1}$

(101) b) $\dfrac{(10)(20)}{20+10} = \dfrac{200}{30}$

$\approx$ [6.7 ohms]