

section 7.3

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$$GLCD = (b+5)(b-5)$$

$$152) \quad \frac{\frac{3b}{b-5}}{\frac{b^2}{b^2-25}} = \frac{\frac{3b}{(b-5)}}{\frac{b^2}{(b+5)(b-5)}} = \left(\frac{\frac{3b}{(b-5)}}{\frac{b^2}{(b+5)(b-5)}} \right) \left(\frac{\frac{(b+5)(b-5)}{1}}{\frac{(b+5)(b-5)}{1}} \right) = \frac{3\cancel{b}^1(b+5)}{\cancel{b}^2 b} = \frac{3(b+5)}{b}$$

$$GLCD = (d+6)(d+3)$$

$$154) \quad \frac{\frac{8}{d^2+9d+18}}{\frac{12}{d+6}} = \frac{\frac{8}{(d+6)(d+3)}}{\frac{12}{(d+6)}} = \left(\frac{\frac{8}{(d+6)(d+3)}}{\frac{12}{(d+6)}} \right) \left(\frac{\frac{(d+6)(d+3)}{1}}{\frac{(d+6)(d+3)}{1}} \right) = \frac{\cancel{8}^2}{12(d+3)} = \frac{2}{3(d+3)}$$

$$GLCD = (2)^2(5)^1 = 20$$

$$156) \quad \frac{\frac{1}{2} + \frac{3}{4}}{\frac{3}{5} + \frac{7}{10}} = \frac{\frac{1}{(2)^1} + \frac{3}{(2)^2}}{\frac{3}{(5)^1} + \frac{7}{(2)^1(5)^1}} = \left(\frac{\frac{1}{(2)^1} + \frac{3}{(2)^2}}{\frac{3}{(5)^1} + \frac{7}{(2)^1(5)^1}} \right) \left(\frac{\frac{(2)^2(5)^1}{1}}{\frac{(2)^2(5)^1}{1}} \right) = \frac{1(2)^1(5)^1 + 3(5)^1}{3(2)^2 + 7(2)^1} = \frac{10+15}{12+14} = \frac{25}{26}$$

$$GLCD = (2)^2(3)^1 = 12$$

$$158) \quad \frac{\frac{1}{2} - \frac{1}{6}}{\frac{2}{3} + \frac{3}{4}} = \frac{\frac{1}{(2)^1} - \frac{1}{(2)^1(3)^1}}{\frac{2}{(3)^1} + \frac{3}{(2)^2}} = \left(\frac{\frac{1}{(2)^1} - \frac{1}{(2)^1(3)^1}}{\frac{2}{(3)^1} + \frac{3}{(2)^2}} \right) \left(\frac{\frac{(2)^2(3)^1}{1}}{\frac{(2)^2(3)^1}{1}} \right) = \frac{1(2)^1(3)^1 - 1(2)^1}{2(2)^2 + 3(3)^1} = \frac{6-2}{8+9} = \frac{4}{17}$$

$$GCD = pq$$

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$$160) \frac{\frac{1}{p} + \frac{p}{q}}{\frac{q}{p} - \frac{1}{q}} = \left(\frac{\frac{1}{p} + \frac{p}{q}}{\frac{q}{p} - \frac{1}{q}} \right) \left(\frac{\frac{pq}{1}}{\frac{pq}{1}} \right) = \frac{1(q) + p(p)}{q(q) - 1(p)} = \frac{q + p^2}{q^2 - p}$$

$$GCD = v^2 w^2$$

$$162) \frac{\frac{2}{v} + \frac{2}{w}}{\frac{1}{v^2} - \frac{1}{w^2}} = \left(\frac{\frac{2}{v} + \frac{2}{w}}{\frac{1}{v^2} - \frac{1}{w^2}} \right) \left(\frac{\frac{v^2 w^2}{1}}{\frac{v^2 w^2}{1}} \right) = \frac{2(vw^2) + 2(v^2 w)}{1(w^2) - 1(v^2)}$$

$$= \frac{2vw^2 + 2v^2 w}{w^2 - v^2} = \frac{2vw(w + v)}{(w + v)(w - v)} = \frac{2vw}{w - v}$$

$$GCD = (y+4)(y-4)$$

$$164) \frac{y - \frac{2y}{y-4}}{\frac{2}{y-4} + \frac{2}{y+4}} = \left(\frac{y - \frac{2y}{y-4}}{\frac{2}{y-4} + \frac{2}{y+4}} \right) \left(\frac{\frac{(y+4)(y-4)}{1}}{\frac{(y+4)(y-4)}{1}} \right) = \frac{y(y+4)(y-4) - 2y(y+4)}{2(y+4) + 2(y-4)}$$

$$= \frac{y(y^2 - 16) - 2y^2 - 8y}{2y + 8 + 2y - 8} = \frac{y^3 - 16y - 2y^2 - 8y}{4y}$$

$$= \frac{y^3 - 2y^2 - 24y}{4y} = \frac{y(y^2 - 2y - 24)}{4y}$$

$$= \frac{y^2 - 2y - 24}{4} = \frac{(y+4)(y-6)}{4}$$

$$GCD = 4(b-5)$$

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$$\begin{aligned}
 166) \quad \frac{4 + \frac{4}{b-5}}{\frac{1}{b-5} + \frac{b}{4}} &= \left(\frac{\frac{4}{1} + \frac{4}{(b-5)}}{\frac{1}{(b-5)} + \frac{b}{4}} \right) \left(\frac{\frac{4(b-5)}{1}}{\frac{4(b-5)}{1}} \right) = \frac{4(4)(b-5) + 4(4)}{-1(4) + b(b-5)} \\
 &= \frac{16b - 80 + 16}{4 + b^2 - 5b} = \frac{16b - 64}{b^2 - 5b + 4} = \frac{16\cancel{(b-4)}}{(b-1)\cancel{(b-4)}} \\
 &= \frac{16}{b-1}
 \end{aligned}$$

$$GCD = (2)^2(3)^2 = 36$$

$$\begin{aligned}
 168) \quad \frac{\frac{1}{4} + \frac{1}{9}}{\frac{1}{6} + \frac{1}{12}} &= \frac{\frac{1}{(2)^2} + \frac{1}{(3)^2}}{\frac{1}{(2)'(3)'} + \frac{1}{(2)^2(3)'}} = \left(\frac{\frac{1}{(2)^2} + \frac{1}{(3)^2}}{\frac{1}{(2)'(3)'} + \frac{1}{(2)^2(3)'}} \right) \left(\frac{\frac{(2)^2(3)^2}{1}}{\frac{(2)^2(3)^2}{1}} \right) \\
 &= \frac{1(3)^2 + 1(2)^2}{1(2)'(3)' + 1(3)'} = \frac{9 + 4}{6 + 3} = \frac{13}{9}
 \end{aligned}$$

$$GCD = (2)'(3)'(5)' = 30$$

$$\begin{aligned}
 170) \quad \frac{\frac{1}{6} + \frac{4}{15}}{\frac{3}{5} - \frac{1}{2}} &= \frac{\frac{1}{(2)'(3)'} + \frac{4}{(3)'(5)'}}{\frac{3}{(5)'} - \frac{1}{(2)'}} = \left(\frac{\frac{1}{(2)'(3)'} + \frac{4}{(3)'(5)'}}{\frac{3}{(5)'} - \frac{1}{(2)'}} \right) \left(\frac{\frac{(2)'(3)'(5)'}{1}}{\frac{(2)'(3)'(5)'}{1}} \right) \\
 &= \frac{1(5)' + 4(2)'}{3(2)'(3)' - 1(3)'(5)'} = \frac{5 + 8}{18 - 15} = \frac{13}{3}
 \end{aligned}$$

$$GLCD = mn$$

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$$172) \frac{\frac{1}{m} + \frac{m}{n}}{\frac{n}{m} - \frac{1}{n}} = \left(\frac{\frac{1}{m} + \frac{m}{n}}{\frac{n}{m} - \frac{1}{n}} \right) \left(\frac{\frac{mn}{1}}{\frac{mn}{1}} \right) = \frac{1(n) + m(m)}{n(n) - 1(m)}$$

$$= \frac{n + m^2}{n^2 - m}$$

$$GLCD = n^2 x^2$$

$$174) \frac{\frac{2}{n} + \frac{2}{x}}{\frac{1}{n^2} - \frac{1}{x^2}} = \left(\frac{\frac{2}{n} + \frac{2}{x}}{\frac{1}{n^2} - \frac{1}{x^2}} \right) \left(\frac{\frac{n^2 x^2}{1}}{\frac{n^2 x^2}{1}} \right) = \frac{2(nx^2) + 2(n^2 x)}{1(x^2) - 1(n^2)}$$

$$= \frac{2nx^2 + 2n^2 x}{x^2 - n^2} = \frac{2nx \cancel{(x+n)}}{\cancel{(x+n)}(x-n)} = \frac{2nx}{\underline{\underline{x-n}}}$$

$$176) \frac{\frac{5}{y-4}}{\frac{3}{y+4} + \frac{2}{y^2-16}} = \frac{\frac{5}{(y-4)}}{\frac{3}{(y+4)} + \frac{2}{(y+4)(y-4)}}$$

$$GLCD = (y+4)(y-4)$$

$$= \left(\frac{\frac{5}{(y-4)}}{\frac{3}{(y+4)} + \frac{2}{(y+4)(y-4)}} \right) \left(\frac{\frac{(y+4)(y-4)}{1}}{\frac{(y+4)(y-4)}{1}} \right)$$

$$= \frac{5(y+4)}{3(y-4) + 2} = \frac{5y + 20}{3y - 12 + 2} = \frac{5y + 20}{\underline{\underline{3y - 10}}}$$

$$\begin{aligned}
 178) \quad \frac{\frac{3}{x+6} + \frac{5}{x-6}}{\frac{1}{x^2-36} + \frac{4}{x+6}} &= \frac{\frac{3}{(x+6)} + \frac{5}{(x-6)}}{\frac{1}{(x+6)(x-6)} + \frac{4}{(x+6)}} \\
 &= \left(\frac{\frac{3}{(x+6)} + \frac{5}{(x-6)}}{\frac{1}{(x+6)(x-6)} + \frac{4}{(x+6)}} \right) \left(\frac{\frac{(x+6)(x-6)}{1}}{\frac{(x+6)(x-6)}{1}} \right) \\
 &= \frac{3(x-6) + 5(x+6)}{1 + 4(x-6)} = \frac{3x - 18 + 5x + 30}{1 + 4x - 24} \\
 &= \frac{8x + 12}{4x - 23}
 \end{aligned}$$

$$\begin{aligned}
 180) \quad \frac{\frac{5}{b^2-6b-27}}{\frac{3}{b-9} + \frac{1}{b+3}} &= \frac{\frac{5}{(b+3)(b-9)}}{\frac{3}{(b-9)} + \frac{1}{(b+3)}} \\
 &= \left(\frac{\frac{5}{(b+3)(b-9)}}{\frac{3}{(b-9)} + \frac{1}{(b+3)}} \right) \left(\frac{\frac{(b+3)(b-9)}{1}}{\frac{(b+3)(b-9)}{1}} \right) \\
 &= \frac{5}{3(b+3) + 1(b-9)} = \frac{5}{3b + 9 + b - 9} = \frac{5}{4b}
 \end{aligned}$$

$$\begin{aligned}
 182) \quad \frac{\frac{6}{d-4} - \frac{2}{d+7}}{\frac{2d}{d^2+3d-28}} &= \frac{\frac{6}{(d-4)} - \frac{2}{(d+7)}}{\frac{2d}{(d+7)(d-4)}} \quad \text{GLCD} = (d+7)(d-4) \\
 &= \left(\frac{\frac{6}{(d-4)} - \frac{2}{(d+7)}}{\frac{2d}{(d+7)(d-4)}} \right) \left(\frac{\frac{(d+7)(d-4)}{1}}{\frac{(d+7)(d-4)}{1}} \right) \\
 &= \frac{6(d+7) - 2(d-4)}{2d} = \frac{6d+42-2d+8}{2d} \\
 &= \frac{4d+50}{2d} = \frac{\cancel{2}(2d+25)}{\cancel{2}d} = \frac{2d+25}{d}
 \end{aligned}$$

$$\begin{aligned}
 184) \quad \frac{\frac{n}{n-2}}{3 + \frac{5}{n-2}} &= \left(\frac{\frac{n}{(n-2)}}{\frac{3}{1} + \frac{5}{(n-2)}} \right) \left(\frac{\frac{(n-2)}{1}}{\frac{(n-2)}{1}} \right) = \frac{n}{3(n-2)+5} \quad \text{GLCD} = (n-2) \\
 &= \frac{n}{3n-6+5} = \frac{n}{3n-1}
 \end{aligned}$$

$$\begin{aligned}
 186) \quad \frac{7 + \frac{2}{q-2}}{\frac{1}{q+2}} &= \left(\frac{\frac{7}{1} + \frac{2}{(q-2)}}{\frac{1}{(q+2)}} \right) \left(\frac{\frac{(q+2)(q-2)}{1}}{\frac{(q+2)(q-2)}{1}} \right) = \frac{7(q+2)(q-2) + 2(q+2)}{1(q-2)} \quad \text{GLCD} = (q+2)(q-2) \\
 &= \frac{7(q^2-4) + 2q+4}{q-2} = \frac{7q^2-28+2q+4}{q-2} \\
 &= \frac{7q^2+2q-24}{q-2} = \frac{(q+2)(7q-12)}{q-2}
 \end{aligned}$$

$$GLCD = vw$$

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$$188) \frac{\frac{v}{w} + \frac{1}{v}}{\frac{1}{v} - \frac{v}{w}} = \left(\frac{\frac{v}{w} + \frac{1}{v}}{\frac{1}{v} - \frac{v}{w}} \right) \left(\frac{\frac{vw}{1}}{\frac{vw}{1}} \right) = \frac{v(v) + 1(w)}{1(w) - v(v)}$$

$$= \frac{v^2 + w}{w - v^2}$$

$$GLCD = (b+5)(b-8)$$

$$190) \frac{\frac{3}{b^2-3b-40}}{\frac{5}{b+5} - \frac{2}{b-8}} = \frac{\frac{3}{(b+5)(b-8)}}{\frac{5}{(b+5)} - \frac{2}{(b-8)}} = \left(\frac{\frac{3}{(b+5)(b-8)}}{\frac{5}{(b+5)} - \frac{2}{(b-8)}} \right) \left(\frac{\frac{(b+5)(b-8)}{1}}{\frac{(b+5)(b-8)}{1}} \right)$$

$$= \frac{3}{5(b-8) - 2(b+5)} = \frac{3}{5b-40-2b-10} = \frac{3}{3b-50}$$

$$192) \frac{\frac{2}{n-9}}{\frac{1}{n+9} + \frac{3}{n^2-81}} = \frac{\frac{2}{(n-9)}}{\frac{1}{(n+9)} + \frac{3}{(n+9)(n-9)}} \quad GLCD = (n+9)(n-9)$$

$$= \left(\frac{\frac{2}{(n-9)}}{\frac{1}{(n+9)} + \frac{3}{(n+9)(n-9)}} \right) \left(\frac{\frac{(n+9)(n-9)}{1}}{\frac{(n+9)(n-9)}{1}} \right)$$

$$= \frac{2(n+9)}{1(n-9) + 3} = \frac{2n+18}{n-9+3} = \frac{2n+18}{n-6}$$

$$\text{G.L.C.D} = (y+3)(y-3)$$

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$$\begin{aligned}
 194) \quad & \frac{\frac{y}{y+3}}{2 + \frac{1}{y-3}} = \left(\frac{\frac{y}{(y+3)}}{\frac{2}{1} + \frac{1}{(y-3)}} \right) \left(\frac{\frac{(y+3)(y-3)}{1}}{\frac{(y+3)(y-3)}{1}} \right) \\
 & = \frac{y(y-3)}{2(y+3)(y-3) + 1(y+3)} \\
 & = \frac{y^2 - 3y}{2(y^2 - 9) + y + 3} = \frac{y^2 - 3y}{2y^2 - 18 + y + 3} \\
 & = \frac{y^2 - 3y}{2y^2 + y - 15} = \frac{y(y-3)}{(y+3)(2y-5)} \\
 & \underline{\underline{\frac{y(y-3)}{(y+3)(2y-5)}}}
 \end{aligned}$$