

Factor the following completely

1. $x^{1/2} - x^{5/2}$

$$x^{1/2} \left(x^{1/2 - 0(1/2)} - x^{5/2 - 2(1/2)} \right)$$

$$x^{1/2} (1 - x^2)$$

$$x^{1/2} (1-x)(1+x)$$

2. $x^{-1/2}(x+3)^{1/2} + x^{1/2}(x+3)^{-1/2}$

$$x^{-1/2} (x+3)^{-1/2} \left[x^{0(1/2)} (x+3)^{1/2 - 1(1/2)} + x^{1/2 - 1(1/2)} (x+3)^{0(1/2)} \right]$$

$$x^{-1/2} (x+3)^{-1/2} [(x+3)' + x']$$

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

$$3. x^{3/2} + 8x^{1/2} + 15x^{-1/2}$$

$$x^{-1/2} \left[x^{3/2 - (-1/2)} + 8x^{1/2 - (-1/2)} + 15x^{0 - (-1/2)} \right]$$

$$x^{-1/2} [x^2 + 8x + 15]$$

$$x^{-1/2} (x+5)(x+3)$$

$$\frac{(x+5)(x+3)}{x^{1/2}}$$

$$4. 2x^{1/2} + 5x^{-1/2} + 2x^{-3/2}$$

$$x^{-3/2} \left[2x^{1/2 - (-3/2)} + 5x^{-1/2 - (-3/2)} + 2x^{0 - (-3/2)} \right]$$

$$x^{-3/2} [2x^2 + 5x + 2]$$

$$x^{-3/2} (2x+1)(x+2)$$

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

$$\begin{array}{l} 2x^2 + 5x + 2 \\ x^2 + 5x + 4 \\ \hline (x+1)(x+4) \\ \frac{2}{2} \quad \frac{2}{2} \\ (2x+1)(x+2) \end{array} \quad \begin{array}{c} 5 \\ 4 \times 4 \\ 1 \end{array}$$

$$5. (x+2)^{7/2} - (x+2)^{3/2}$$

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

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

diff of squares

$$(x+2)^{3/2} [(x+2) - 1][(x+2) + 1]$$

$$(x+2)^{3/2} (x+1)(x+3)$$

$$6. 4(x+1)^{1/2} - 5(x+1)^{3/2} + (x+1)^{5/2}$$

$$(x+1)^{1/2} \left[4(x+1)^{0} - 5(x+1)^1 + (x+1)^2 \right]$$

$$(x+1)^{1/2} [4 - 5(x+1) + (x+1)^2]$$

$$(x+1)^{1/2} [4 - 5x - 5 + x^2 + 2x + 1]$$

$$(x+1)^{1/2} [x^2 - 3x]$$

$$x(x+1)^{1/2}(x-3)$$

$$7. x^{1/2} - 3x^{1/3} - 3x^{1/6} - 9$$

$$x^{1/6} [x^{1/2 - (1/6)} - 3x^{1/3 - (1/6)} - 3x^{1/6 - (1/6)}] - 9$$

$$x^{1/6} [x^{1/3} - 3x^{1/6} - 3] - 9$$

→ if this was a "t" it'd
be a WAY better problem... :-)

$$8. 12x^{4/3} - 5x^{2/3} - 2$$

$$12(x^{2/3})^2 - 5(x^{2/3}) - 2$$

$$\text{let } t = x^{2/3}$$

$$12t^2 - 5t - 2$$

$$t^2 - 5t - 24$$

$$(t - 8)(t + 3)$$

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

$$(3t - 2)(4t + 1)$$

$$(3x^{2/3} - 2)(4x^{2/3} + 1)$$

$$\begin{array}{r} -24 \\ -8 \quad 3 \\ -5 \end{array}$$

sub back.

$$9. x^{3/5} + 5x^{2/5} - 3x^{1/5} - 15$$

$$x^{2/5} (x^{1/5} + 5) - 3(x^{1/5} + 5)$$

$$x^{2/5} (x^{1/5} + 5) - 3(x^{1/5} + 5)$$

$$(x^{2/5} - 3)(x^{1/5} + 5)$$

$$10. e^{2x} - 3e^x + 2$$

$$(e^x)^2 - 3(e^x) + 2$$

$$t^2 - 3t + 2$$

$$(t-1)(t-2)$$

$$(e^x - 1)(e^x + 2)$$

let $t = e^x$

$$\begin{array}{c} 2 \\ -1 \quad -2 \\ -3 \end{array}$$

Sub
back
in...

$$11. e^{4x} + 5e^{2x} - 24$$

$$(e^{2x})^2 + 5(e^{2x}) - 24$$

$$\text{let } t = e^{2x}$$

$$t^2 + 5t - 24$$

$$(t+8)(t-3)$$

$$(e^{2x} + 8)(e^{2x} - 3)$$

Sub
back
in...

$$\begin{array}{r} -24 \\ 8 \times -3 \\ 5 \end{array}$$

$$12. (x-5)^{-\frac{1}{2}}(x+5)^{-\frac{1}{2}} - (x+5)^{\frac{1}{2}}(x-5)^{-\frac{3}{2}}$$

$$(x-5)^{-\frac{3}{2}}(x+5)^{-\frac{1}{2}} \left[(x-5)^{-\frac{1}{2} - (-\frac{1}{2})} (x+5)^{-\frac{1}{2} - (-\frac{1}{2})} - (x+5)^{\frac{1}{2} - (-\frac{1}{2})} (x-5)^{-\frac{3}{2} - (-\frac{3}{2})} \right]$$

$$(x-5)^{-\frac{3}{2}}(x+5)^{-\frac{1}{2}} [(x-5) - (x+5)]$$

$$\frac{-10}{(x-5)^{\frac{3}{2}}(x+5)^{\frac{1}{2}}}$$