

Exercise A.10.123 Factor:

$$6x^{1/2}(x^2+x) - 8x^{3/2} - 8x^{1/2} \text{ where } x \geq 0.$$

Solution

We have by the properties of roots (Note A.10.A)

$$\begin{aligned} & 6x^{1/2}(x^2+x) - 8x^{3/2} - 8x^{1/2} \\ &= 6x^{1/2}(x^2+x) - 8x^{1/2}(x+1) \\ &= 6x^{1/2}x^{1/2}(x^{3/2}+x^{1/2}) - 8x^{1/2}(x+1) \\ &= 6x(x^{3/2}+x^{1/2}) - 8x^{1/2}(x+1) \\ &= \boxed{(6x - 8x^{1/2})(x^{3/2} + x^{1/2})}. \quad \square \end{aligned}$$