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$$\int x\sqrt{x+1} dx$$

Explore four possibilities to evaluate the integral  $\int x\sqrt{x+1} dx$ . Analyze which approaches work and which don't. Remember that sometimes, multiple substitutions are possible, as is integrating by parts more than once.

1. By u-substitution,  $u = \sqrt{x+1}$
2. By u-substitution,  $u = x+1$
3. By parts, let  $f(x) = x$ , and  $g'(x) = \sqrt{x+1}$
4. By parts, let  $f(x) = \sqrt{x+1}$  and  $g'(x) = x$



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