

Which technique:  $u$ -substitution or integration by parts?

If you choose  $u$ -substitution, then identify the substitution, and perform the substitution converting the given integral (involving  $x$ ) to an easier integral involving  $u$ .

If you choose integration by parts, identify  $u$ ,  $dv$ , and the new easier integration problem (in terms of  $x$ ) along with its relation to the original integration problem.

1.  $\int x e^{x^2} dx$

2.  $\int x e^x dx$

3.  $\int x^2 e^x dx$

4.  $\int \frac{\ln 2x}{x} dx$

5.  $\int \frac{(\ln 5x)^2}{x} dx$

6.  $\int \frac{\ln x}{x^2} dx$

7.  $\int \frac{(\ln x)^2}{x^2} dx$

8.  $\int \frac{\ln x^2}{x} dx$

9.  $\int \frac{\ln x^2}{x^2} dx$

10.  $\int \ln x dx$

11.  $\int (\ln x)^2 dx$

12.  $\int x \sin x dx$

13.  $\int x^2 \sin x dx$

14.  $\int x \sin x^2 dx$

15.  $\int e^{2x} \sin x dx$

16.  $\int \frac{\arctan x}{x^2 + 1} dx$

17.  $\int x^2 \arctan x dx$

18.  $\int \frac{x}{1 + x^2} dx$

19.  $\int \frac{x^2}{1+x^2} dx$

20.  $\int \frac{x^3}{1+x^2} dx$

21.  $\int \frac{x^4}{1+x^2} dx$