

Goal: To identify what (if any)  $u$ -substitutions are necessary to compute an integral and to practice making such substitutions.

For each problem, identify what (if any)  $u$ -substitution(s) need to be made to evaluate each integral. Make the substitution and simplify, but **do not** evaluate the integral.

1.  $\int x \sin(x^2) dx$

2.  $\int \sqrt{x}(x+3) dx$

3.  $\int x\sqrt{x+3} dx$

4.  $\int \frac{\sqrt{\ln(x)}}{x} dx$

5. 
$$\int \frac{x+4}{x} dx$$

6. 
$$\int \frac{x}{x+4} dx$$

7. 
$$\int \frac{e^x}{\sqrt{1-e^{2x}}} dx$$

8. 
$$\int \frac{\arctan(x)}{1+x^2} dx$$

9. 
$$\int \frac{x^3}{(1+x^2)^2} dx$$

10. 
$$\int \frac{x^2}{\sqrt{1-x^3}} dx$$

11. 
$$\int \sin(x)(3 \cos^4(x) + 4 \cos^3(x) - 9) dx$$

12. 
$$\int x^3 + e^{3-x} dx$$

13. 
$$\int \frac{\sin(\sqrt{x}+1)}{\sqrt{x}} + \frac{1}{x^2+1} dx$$