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

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

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

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

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