Math 102 — Integration by substitution

Problem 1. Find the following indefinite integrals using substitution. Identify w and compute $dw = w'(x)\,dx$ to start.

a. $\int x^2 e^{x^3+1}\,dx$

b. $\int x(x^2+3)^2\,dx$

c. $\int \sin x \cos x\,dx$

d. $\int \frac{1}{x \ln x}\,dx$

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

Problem 2. Find the following indefinite integrals using substitution.

a. $\int e^{4x}\,dx$

b. $\int e^{-x}\,dx$

c. $\int \sin(2x)\,dx$

d. $\int \cos(5-x)\,dx$

e. $\int \frac{3}{2x+1}\,dx$

f. $\int \frac{7}{1-3x}\,dx$

Problem 3. Find the following indefinite integrals.

a. $\int \sin^6 x \cos x\,dx$

b. $\int \frac{\sin\sqrt{x}}{\sqrt{x}}\,dx$

c. $\int \tan x\,dx$

d. $\int x(x+1)^{1/3}\,dx$

e. $\int x^2(1+x)^2\,dx$