

INTRODUCTION TO CALCULUS

MATH 1A

UNIT 28: WORKSHEET

Substitution

Problem 1:

$$\int x^2 e^{x^3} dx$$

Solution:

Take $u = x^3$ which gives $du = 3x^2 dx$ and so $\int e^u du/3 = e^u/3 + C = e^{x^3}/3 + C$.

Problem 2:

$$\int \frac{1}{(x+8)^5} dx$$

Solution:

Take $u = x + 8$. Then $u^{-4}/4 + C = (x + 8)^{-4}/4 + C$.

Problem 3:

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

Solution:

Take $u = 1 + x^2$, $du = 2x dx$ then $\int 1/(2u) du = \ln(u)/2 du = \ln(1 + x^2)/2$.

Problem 4:

$$\int \frac{\log(5x)}{x} dx$$

Solution:

Take $u = \log(5x)$ to get $du = dx/(5x)$.

Problem 5:

$$\int \frac{e^x}{(e^x + 5)^2} dx$$

Solution:

(In class, we had solved the problem without square) $\int \frac{e^x}{(e^x+5)}$ which gave $\ln(e^x + 5) + C$.
Take $u = e^x + 5$, $du = e^x dx$ so get $-(e^x + 5)^{-1} + C$.