

# MEMORIAL UNIVERSITY OF NEWFOUNDLAND

## DEPARTMENT OF MATHEMATICS AND STATISTICS

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SECTION 1.4

Math 1001 Worksheet

WINTER 2023

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**For practice only. Not to be submitted.**

1. Evaluate each indefinite integral using integration by parts.

(a)  $\int x \cos(x) dx$

(b)  $\int x^2 \cos(x) dx$

(c)  $\int x \tan(x) \sec(x) dx$

(d)  $\int y^7 e^{y^4} dy$

(e)  $\int e^{3x} \sin(5x) dx$

(f)  $\int \cos(x) \cos\left(\frac{2x}{3}\right) dx$

(g)  $\int \arcsin(6x) dx$

2. (a) Use integration by parts to prove the reduction formula

$$\int \sin^n(x) dx = -\frac{1}{n} \cos(x) \sin^{n-1}(x) + \frac{n-1}{n} \int \sin^{n-2}(x) dx,$$

where  $n$  is a positive integer.

(b) Use this formula to evaluate  $\int \sin^7(x) dx$ .

3. Evaluate each of the following integrals using any combination of elementary integrals, integrals leading to inverse trigonometric functions,  $u$ -substitution and integration by parts.

(a)  $\int \frac{x}{\sqrt{x^2 - 9}} dx$

(b)  $\int \frac{1}{x\sqrt{x^2 - 9}} dx$

(c)  $\int x \csc^2(9x) dx$

(d)  $\int x^4 e^{x^5} dx$

(e)  $\int x^9 e^{x^5} dx$

(f)  $\int \frac{1}{9x^2 - 12x + 8} dx$

(g)  $\int e^{4x} \cos(x) dx$

(h)  $\int \frac{12x^2 - 32x + 14}{2x - 5} dx$

(i)  $\int \frac{1}{x\sqrt{4 - \ln^2(x)}} dx$

(j)  $\int \cos^2(x)[1 + \tan^2(x)] dx$