

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

SECTION 1.4

Math 1001 Worksheet

FALL 2025

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

3. (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 $\int \sin^7(x) dx$.