MEMORIAL UNIVERSITY OF NEWFOUNDLAND
DEPARTMENT OF MATHEMATICS AND STATISTICS

SECTION 3.3 — **Math 1001 Worksheet** — WINTER 2024

For practice only. Not to be submitted.

1. Evaluate each of the following integrals using the method of trigonometric substitution.

   (a) $\displaystyle \int \frac{1}{\sqrt{x^2 - 36}}\, dx$

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

   (c) $\displaystyle \int_0^2 \sqrt{16 - x^2}\, dx$

2. Trigonometric substitution can be a consequence of u-substitution. Use this approach to evaluate
$$\int \sqrt{e^{6x} - 4}\, dx.$$

3. Trigonometric substitution can be a consequence of completing the square. Use this approach to evaluate
$$\int \frac{x^2}{\sqrt{4x - x^2}}\, dx.$$

4. The following integrals could use any of the techniques that we've introduced in this course. Determine the appropriate technique, and evaluate the integral.

   (a) $\displaystyle \int \frac{x}{\sqrt{x^2 + 4}}\, dx$

   (b) $\displaystyle \int \frac{\sqrt{4 - x^2}}{x}\, dx$

   (c) $\displaystyle \int \frac{1}{4x^2 - 12x + 13}\, dx$

   (d) $\displaystyle \int \frac{1}{4x^2 - 4x - 3}\, dx$

   (e) $\displaystyle \int \frac{1}{x[\ln(x)]^2}\, dx$

   (f) $\displaystyle \int x[\ln(x)]^2\, dx$

(g) $\displaystyle\int \sin^3(x)\cos^3(x)\,dx$

(h) $\displaystyle\int \sin^3(x)\csc^3(x)\,dx$

(i) $\displaystyle\int x\tan^2(x)\,dx$