MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 3 **MATHEMATICS 1001** FALL 2019

Due: Friday, October 4th, 2019 at 4:00pm. SHOW ALL WORK.

Note: You are encouraged to complete the WebAssign problem set "Indefinite Integrals by Parts" and the "Worksheet on Basic Integration" before you work on this assignment.

1. Use integration by parts to evaluate the following indefinite integrals.

   (a) $\displaystyle\int \frac{x^3}{e^{3x}}\,dx$

   (b) $\displaystyle\int \ln^2(x)\,dx$

   (c) $\displaystyle\int x\arctan(x)\,dx$

   (d) $\displaystyle\int \sinh(3t)\cos(7t)\,dt$

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

   $$\int \sec^n(x)\,dx = \frac{\tan(x)\sec^{n-2}(x)}{n-1} + \frac{n-2}{n-1}\int \sec^{n-2}(x)\,dx, \quad n \neq 1.$$

   (b) Use the reduction formula to evaluate $\displaystyle\int \sec^6(x)\,dx$.

3. Use any appropriate method (or combination of methods) to evaluate each of the following.

   (a) $\displaystyle\int x^2\cos(x^3)\,dx$

   (b) $\displaystyle\int x^3\cos(x^2)\,dx$

   (c) $\displaystyle\int \sqrt{x}\cos\left(\sqrt{x}\right)\,dx$

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