\[
\frac{d}{dx} x^n = nx^{n-1} \quad \int x^n \, dx = \frac{x^{n+1}}{n+1} + C \quad \int (ax+b)^n \, dx = \frac{1}{a} \frac{(ax+b)^{n+1}}{n+1} + C
\]
\[
\frac{d}{dx} \ln |x| = \frac{1}{x} \quad \int \frac{1}{x} \, dx = \ln |x| + C \quad \int \frac{1}{ax+b} \, dx = \frac{1}{a} \ln |ax+b| + C
\]
\[
\frac{d}{dx} e^x = e^x \quad \int e^x \, dx = e^x + C \quad \int e^{ax} \, dx = \frac{1}{a} e^{ax} + C
\]
\[
\frac{d}{dx} \sin x = \cos x \quad \int \cos x \, dx = \sin x + C \quad \int \cos ax \, dx = \frac{1}{a} \sin ax + C
\]
\[
\frac{d}{dx} \cos x = -\sin x \quad \int \sin x \, dx = -\cos x + C \quad \int \sin ax \, dx = -\frac{1}{a} \cos x + C
\]

**Chain rule:**

\[
\frac{d}{dx} f(u) = \frac{df}{du} \frac{du}{dx} \quad \int f(u) \, \frac{du}{dx} \, dx = \int f(u) \, du = F(u) + C = F(u(x)) + C
\]

**Maple:**

\[
\text{diff} (f(x), x) ; \quad \text{simplify} (\%) ;
\]
\[
\text{int} (f(x), x) ; \quad \text{simplify} (\%) ;
\]

Any integral other than those above and those which arise from them by a simple "u-substitution" you will be expected to evaluate using technology.

**MAT 2705**

this is not a course in integration but in using integrals appropriately in solving deqs.

similarly, we need to do derivatives to check solutions of deqs.

**MAT 2500**

this is not a course in differentiation and integration,

but in how to do those same operations in a setting with more than one independent variable or vector variables with
Some Algebra Rules

distributive rule: \( a(b + c) = ab + ac \) \[ a + ac = a + ac = a(c + c) \]

fractions:
\[
\begin{align*}
\frac{a + b}{c} &= \frac{ad + bc}{bd} = \frac{ad + bc}{bd} \\
\frac{a}{b} + \frac{c}{d} &= \frac{a \cdot d + b \cdot c}{b \cdot d} \\
\frac{a}{b} + \frac{c}{d} &= \frac{a}{b} + \frac{c}{d} \\
\frac{a}{b} - \frac{c}{d} &= \frac{a}{b} - \frac{c}{d} \\
\frac{a}{b} \cdot \frac{c}{d} &= \frac{a \cdot c}{b \cdot d} \\
\frac{a}{b} \div \frac{c}{d} &= \frac{a \cdot d}{b \cdot c} \\
\end{align*}
\]

exponent rules:
\[
\begin{align*}
\text{exponent addition: } a^m \cdot a^n &= a^{m+n} \\
\text{exponent subtraction: } a^m \div a^n &= a^{m-n} \\
\text{exponent multiplication: } (a^m)^n &= a^{mn} \\
\text{exponent division: } \frac{a^m}{a^n} &= a^{m-n} \\
\end{align*}
\]

These are some basic algebra rules and formulas that are commonly used in math. For example, the distributive property is a fundamental rule that allows us to simplify expressions. Fractions can be added, subtracted, multiplied, and divided according to specific rules. Exponents can be manipulated using rules for addition, subtraction, multiplication, and division. These rules are crucial for solving equations and simplifying algebraic expressions.