Notes 2.1 **Antiderivatives (Indefinite Integrals)**

- Reversing the operation of finding a derivative is called antiderivative.

$f(x) = x^2 + 3$ and $f'(x) = 2x$ In words, the antiderivative of 2x is $x^2 + C$

- We use the integral sign $\int$ for this operation called integration.

$\int 2x\ dx = x^2 + C$

$\int x^n \text{ dx} = \frac{x^{n+1}}{n+1} + C$ increase the exponent by 1, then divide by the new exponent.

$\int x^{-1} \text{ dx} = \ln|x| + C$ $\int \sin ax \text{ dx} = -\frac{1}{a}\cos ax + C$

$\int \cos ax \text{ dx} = \frac{1}{a}\sin ax + C$ $\int e^{ax} \text{ dx} = \frac{1}{a}e^{ax} + C$

Find the following indefinite integrals by Integrating.

1. $\int x\ dx$
2. $\int 6x\ dx$
3. $\int 5 \text{ dx}$
4. $\int 8x^5\ dx$
5. $\int \frac{1}{x^3} \text{ dx}$
6. $\int x^{-1} \text{ dx}$
7. $\int (12u^2 - 8u + 5)\ du$
8. $\int (3t + 5)^2\ dt$

$\int \sin ax \text{ dx} = -\frac{1}{a}\cos ax + C$

$\int \cos ax \text{ dx} = \frac{1}{a}\sin ax + C$ $\int e^{ax} \text{ dx} = \frac{1}{a}e^{ax} + C$

9. $\int \sin 3x \text{ dx}$

10. $\int \cos 5x \text{ dx}$

11. $\int e^{3t} \text{ dt}$