# Chapter 1

# Practice Problems

DATE: 2020-07-25
ANNOUNCEMENTS:

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## 1.1 Techniques of Intigration

### 1.1.1 U substitution

$$\int \ln(2x+1)dx$$

### 1.1.2 Integration by parts

**Type 1**

$$\int \text{(poly'al)} \begin{pmatrix} e^x \\ \sin x \\ \cos x \end{pmatrix} dx$$

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

$$\int x^2 e^x dx.$$

$$\int x^4 \cos x dx.$$

**Type 2**

$$\int \begin{pmatrix} e^x \\ \sin x \\ \cos x \end{pmatrix} \begin{pmatrix} e^x \\ \sin x \\ \cos x \end{pmatrix} dx$$

$$\int e^x \sin x dx.$$

$$\int \cos x \sin^2 x dx.$$

**Type 3**

$$\int \begin{pmatrix} \text{Involves} \\ \text{an} \\ \text{inverse} \end{pmatrix} dx$$

$$\int x \ln x dx$$

$$\int \ln(2x+1) dx$$

**Tabular Integration**

$$\int x^3 e^{2x} dx.$$

### 1.1.3 Trigonometric Substitution

**Sine Case** $(a^2 - bx^2)^n$

**Tangent Case** $(a^2 + bx^2)^n$

$$\int \frac{x^3}{\sqrt{x^2+1}} dx.$$

**Secant case** $(bx^2 - a^2)^n$