

NAME: Ugohwe Fortune

Department: Mechanical Engr.

Matric No: 19/EN006/059

$$1. \frac{11-3x}{x^2+2x-3} \neq$$
$$\int \left( 2x - \frac{3}{x} + 8 \right) dx$$
$$\int x dx$$

$$\int x^n dx = \frac{x^{n+1}}{n+1} \quad \text{with } n=1 = \frac{x^2}{2}$$

$$\int \frac{1}{x} dx = \ln(x)$$

$$\int 1 dx = x$$

$$2 \int x dx - 3 \int \frac{1}{x} dx + 8 \int 1 dx = 3 \ln(x) + x^2 + 8x$$
$$= -3 \ln(|x|) + x^2 + 8x + C$$
$$= x(x+8) - 3 \ln(|x|) + C$$

$$2. \quad 4 \int x^2 dx - 8 \int x dx - 35 \int \frac{1}{x^3} dx - 6 \int 1 dx$$
$$\int x^2 dx$$

$$\int x^n dx = \frac{x^{n+1}}{n+1} \quad n=2$$
$$= \frac{x^3}{3}$$

$$\int x dx \quad \text{with } n=1$$
$$= \frac{x^2}{2}$$

$$\int \frac{1}{x^3} dx \quad \text{with } n=-3$$
$$= -\frac{1}{2x^2}$$

$$\therefore 4 \int x^2 dx - 8 \int x dx - 35 \int \frac{1}{x^3} dx - 6 \int 1 dx$$
$$= \frac{4x^3}{3} - 4x^2 + 6x + \frac{35}{2x^2} + C$$

$$3. \int \frac{1}{x^2 + 121} dx$$

$$\text{sub. } u = \frac{x}{11} \rightarrow \frac{du}{dx} = \frac{1}{11} \quad (\text{steps})$$

$$dx = 11 du$$

$$= \int \frac{11}{121u^2 + 121}$$

$$= \frac{1}{11} \int \frac{1}{u^2 + 1} du$$

$$= \arctan(u)$$

$$\frac{1}{11} \int \frac{1}{u^2 + 1} du$$

$$= \frac{\arctan(u)}{11}$$

$$\text{Undo sub. } u = \frac{x}{11}$$

$$= \frac{\arctan\left(\frac{x}{11}\right)}{11}$$

$$\int \frac{1}{x^2 + 121} dx$$

$$= \frac{\arctan\left(\frac{x}{11}\right)}{11} + C$$