

Objective: Use the method of completing the square to integrate a function.

Integrate the following indefinite integral $\int \frac{2x-5}{x^2+2x+2} dx$.

ANSWER:

$$\int \frac{2x-5}{x^2+2x+2} dx = \int \frac{2x+2}{x^2+2x+2} dx - 7 \int \frac{1}{1+(x+1)^2} dx$$

$$\text{Let } u = x^2 + 2x + 2$$

$$\frac{du}{dx} = 2x + 2$$

$$du = 2x + 2 dx$$

$$\text{Let } u = x + 1$$

$$\frac{du}{dx} = 1$$

$$du = 1 dx$$

$$\text{So, } \int \frac{1}{u} du - 7 \int \frac{1}{1+u^2} du$$

$$= \ln|u| - 7 \arctan(u) + C$$

$$= \ln|x^2 + 2x + 2| - 7 \arctan(x + 1) + C$$