

1.4 Homework

(29) $\int \frac{x+4}{x^2+2x+5} dx$

$$\int \frac{x+4}{x^2+2x+5} dx$$

$$\int \frac{x+1+3}{x^2+2x+5} dx$$

$$\frac{1}{2} \int \frac{2(x+1)}{x^2+2x+5} dx + \int \frac{3}{x^2+2x+5} dx$$

$$\begin{aligned} u &= x^2+2x+5 \\ du &= (2x+2)dx \\ &= 2(x+1)dx \end{aligned}$$

$$\frac{1}{2} \ln|x^2+2x+5| + \int \frac{3}{(x+1)^2+4} dx$$

$$\frac{1}{2} \ln|x^2+2x+5| + \frac{3}{2} \tan^{-1}\left(\frac{x+1}{2}\right) + C$$

Look at

Integrand: If you can get

it in the form $\frac{w'}{w}$, you're in business, since

$$\int \frac{1}{w} dw = \int \frac{w'}{w} dx = \ln|w| + C$$

where $w = f(x)$
 $dw = f'(x) dx = w' dx$

$$(x^2+2x+5)'$$

$$= 2x+2$$

$$= 2(x+1)$$

$$x^2+2x+5$$

$$\boxed{x^2+2x+1} + 5 - 1$$

$$(x+1)^2 + 4$$

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

$$\frac{1}{a} \tan^{-1} \frac{x}{a} + C$$

$$\frac{1}{2} \ln|x^2+2x+5| + \frac{3}{2} \tan^{-1}\left(\frac{x+1}{2}\right) + C$$

$$\frac{1}{a} \tan^{-1} \frac{x}{a} + C$$