

Hwk - Quiz - 1/13/06

$$\begin{aligned} (\S 5.5\#33) \quad \int \frac{1+x}{1+x^2} dx &= \int \frac{1}{1+x^2} dx + \int \frac{x}{1+x^2} dx \\ &= \tan^{-1}(x) + \int \frac{1}{u} \frac{du}{2} \\ &= \tan^{-1}(x) + \frac{1}{2} \int \frac{1}{u} du \\ &= \tan^{-1}(x) + \frac{1}{2} \ln|u| + C \\ &= \tan^{-1}(x) + \frac{1}{2} \ln|1+x^2| + C \\ &= \boxed{\tan^{-1}(x) + \frac{1}{2} \ln(1+x^2) + C} \end{aligned}$$

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

$\therefore$  notice  $1+x^2 > 0$   
So we can drop the abs. value bars.

$$\begin{aligned} (\S 5.5\#10) \quad \int x e^{x^2} dx &= \int x e^{x^2} \frac{du}{2x} \\ &= \frac{1}{2} \int e^u du \\ &= \frac{1}{2} e^u + C \\ &= \boxed{\frac{1}{2} e^{x^2} + C} \end{aligned}$$

$$\begin{aligned} u &= x^2 \\ du &= 2x dx \\ dx &= \frac{du}{2x} \end{aligned}$$