Hwk - Quiz - 1/13/06

(§ 5.5 # 33)

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

$u = 1+x^2$
$du = 2x\,dx$
$\frac{du}{2} = x\,dx$

$$= \tan^{-1}(x) + \int \frac{1}{u}\frac{du}{2}$$

$$= \tan^{-1}(x) + \frac{1}{2}\int \frac{1}{u}\,du$$

$$= \tan^{-1}(x) + \frac{1}{2}\ln|u| + C$$

$$= \tan^{-1}(x) + \frac{1}{2}\ln|1+x^2| + C$$

: notice $1+x^2 > 0$ so we can drop the abs. value bars.

$$= \boxed{\tan^{-1}(x) + \frac{1}{2}\ln(1+x^2) + C}$$

(§ 5.5 # 10)

$$\int x e^{x^2}\,dx = \int x e^{x^2}\frac{du}{2x}$$

$u = x^2$
$du = 2x\,dx$
$dx = \frac{du}{2x}$

$$= \frac{1}{2}\int e^u\,du$$

$$= \frac{1}{2}e^u + C$$

$$= \boxed{\frac{1}{2}e^{x^2} + C}$$