Stand and Deliver

5.5

Integral of a^u

$$\int a^u\,du = \frac{1}{\ln a}\cdot a^u + c$$

Ex. 3

a) $\int 4^x\,dx$

$$\boxed{\frac{1}{\ln 4}\cdot 4^x + c}$$

$$\int a^u\,du = \frac{1}{\ln a}\cdot a^u + c$$

Ex. 3

b)

$$\int (3-x)7^{(3-x)^2}\,dx$$

$u=(3-x)^2$

$du=2(3-x)'(-1)\,dx$

$du=-2(3-x)\,dx$

$-\frac{1}{2}du=(3-x)\,dx$

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

$-\frac{1}{2}\cdot\frac{1}{\ln 7}\cdot 7^u+C$

$-\frac{1}{2\ln 7}\cdot 7^{(3-x)^2}+C$

Ex. 3

c)

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

$\frac{d}{dx}[a^u]=\ln a\cdot a^u\cdot u'$

$u=1+2^{3x}$

$du=\ln 2\cdot 2^{3x}\cdot 3\,dx$

$du=3\ln 2\cdot 2^{3x}\,dx$

$\frac{1}{3\ln 2}du=2^{3x}\,dx$

$\frac{1}{3\ln 2}\int\frac{1}{u}\,du$

$\frac{1}{3\ln 2}\ln|u|+C$

$\frac{1}{3\ln 2}\ln|1+2^{3x}|+C$

Applications

For n compoundings per year

$$A = P\left(1+\frac{r}{n}\right)^{nt}$$

A = amount at end
P = principal
r = rate as decimal
n = # of times compounded
t = # of years

Possibilities for n

annually = 1
semiannually = 2
quarterly = 4
monthly = 12
weekly = 52
daily = 365

For continuous compounding

$$A = Pe^{rt}$$