p 338

#18 $\frac{1}{4}\sin(2x^2)+C$ Check: $\frac{d}{dx}\left(\frac{1}{4}\sin(2x^2)+C\right)=\frac{1}{4}\cos(2x^2)(4x)=x\cos(2x^2)$

#20 $(7x-2)^4+C$ Check: $\frac{d}{dx}\left[(7x-2)^4+C\right]=4(7x-2)^3(7)=28(7x-2)^3$

#26 $-6\sqrt{1-r^3}+C$ Check: $\frac{d}{dx}\left(-6\sqrt{1-r^3}+C\right)=-6\left(\frac{1}{2\sqrt{1-r^3}}\right)(-3r^2)=\frac{9r^2}{\sqrt{1-r^3}}$

#28 $\sec\left(\theta+\frac{\pi}{2}\right)+C$

#30 $-3\cot x+C$

#32 $-\frac{2}{3}(\cot x)^{3/2}+C$

p. 338 #18

$$\int x\cos(2x^2)\,dx$$

$u=2x^2$

$du=4x\,dx$

$$=\frac{1}{4}\int\cos(2x^2)\cdot 4x\,dx$$

$$=\frac{1}{4}\int\cos u\cdot du$$

$$=\frac{1}{4}\sin u+C$$

$=\frac{1}{4}\sin(2x^2)+C$

$\int \cos u \, du$

$\sin u + C$

where did the $\int$ and $du$ go?

$2 \cdot 2$

$4$

where did the 2s and $\cdot$ go?

#20

$$\int u^n du = \frac{u^{n+1}}{n+1} + C$$

power

$\int 28(7x-2)^3 dx$

$u = 7x - 2$

$du = 7dx$

$\int 4 \cdot (7x-2)^3 \cdot 7dx$

$4 \int u^3 du$

$\cancel{4} \cdot \frac{u^4}{\cancel{4}} + C$

$(7x-2)^4 + C$

# Definite integrals with u-substitution.

$$\int_{x_1}^{x_2} f(x)\,dx$$ (hard)

$u =$ ....

$$\int_{u(x_1)}^{u(x_2)} g(u)\,du$$ (less hard)

#53 $\int_0^3 \sqrt{y+1}\,dy$

$u = y+1$

$du = dy$

lower limit

$u(0) = 0+1$

$= 1$

upper limit

$u(3) = 3+1$

$= 4$

$$\int_1^4 (u)^{1/2}\,du$$

$$\frac{2}{3}u^{3/2}\Big|_1^4$$

$$\frac{2}{3}\left(4^{3/2} - 1^{3/2}\right)$$

$$\frac{2}{3}(8-1) = \frac{14}{3}$$