Integration Quiz Review

power

rational

trig (sine & cosine)

U-substitution

definite & indefinite

area under curve

Volume $V = \pi \int_{p}^{q} y^2 dx$

power

indefinite $\int_5 3x^2\,dx = \frac{3x^3}{3} = x^3 + C$

definite $\int_3 3x^2\,dx = \frac{3x^3}{3} = x^3\Big|_3^5 = 5^3 - 3^3 = 125 - 27 = 98$

$$\int_5^3 3x^2\,dx = -\int_3^5 3x^2\,dx = -\left[x^3\right]\Big|_3^5 = -\left[125-27\right] = -98$$

$$x^3\Big|_5^3 = 27 - 125 = -98$$

rational

$$\int \frac{1}{x}\,dx = \ln|x| + C$$

$$\int_3^5 \frac{1}{x}\,dx = \ln|5| - \ln|3| = \ln\left|\frac{5}{3}\right| \approx 0.51$$

trig

$$\int \sin x \, dx = -\cos x + C$$

$$\int \cos x \, dx = \sin x + C$$

U-substitution

$$\int (3x^2+5)6x\,dx = \int u\,du = \frac{u^2}{2}+C$$

$u = 3x^2+5$

$du = 6x\,dx$

$$= \frac{(3x^2+5)^2}{2}+C$$

$$\int \sqrt{3x}\,dx = \int \frac{\sqrt{u}\,du}{3} = \frac{1}{3}\int \sqrt{u}\,du = \frac{1}{3}\int u^{1/2}\,du$$

$u = 3x$

$\frac{du}{3} = \frac{3dx}{3}$

$dx = \frac{du}{3}$

$$= \frac{1}{3}\left[\frac{u^{3/2}}{3/2}\right]+C$$

$$= \frac{1}{3}\left[\frac{2u^{3/2}}{3}\right]+C = \frac{2u^{3/2}}{9}+C$$

$$= \frac{2(3x)^{3/2}}{9}+C$$

$$\int \frac{1}{x+5}\,dx = \int \frac{1}{u}\,du = \ln|u| = \ln|x+5|+C$$

$u = x+5$

$du = 1\,dx$

$$\int \cos(3x)\,dx = \int \frac{\cos u}{3}\,du = \frac{1}{3}\int \cos u\,du$$

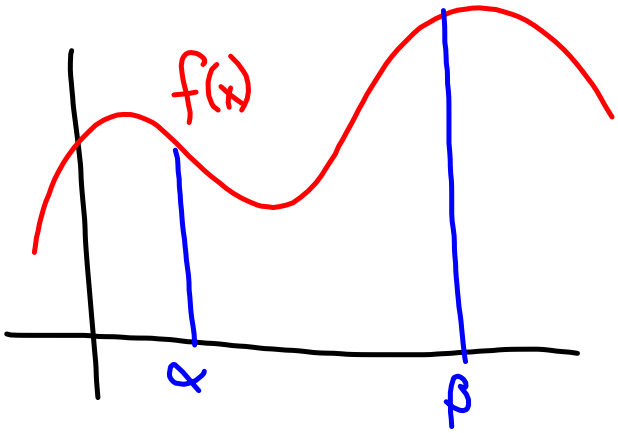
$u = 3x$

$du = 3dx$

$dx = \frac{du}{3}$

$$= \frac{1}{3}\left[\sin u\right]+C = \frac{\sin(3x)}{3}+C$$

area under curve



$$A = \int_{\alpha}^{\beta} f(x)\,dx$$

Volume

$$V = \pi \int_{a}^{b} y^2 dx$$