$$\int_2^{12} f(x) = \int_2^{12} B_0 + A_1 \sin(\alpha x) + B_1 \cos(\alpha x) + A_2 \sin(2\alpha x) + B_2 \cos(2\alpha x) + A_3 \sin(3\alpha x) + \dots$$

$$\int_2^{12} \sin(ax+b) = -\frac{1}{a}\cos(ax+b) + C$$

$$\int_2^{12} \cos(ax+b) = \frac{1}{a}\sin(ax+b) + C$$

$$\int_2^{12} f(x) = \cancel{-A\,\frac{1}{\alpha}\cos(\alpha x)} + B_1$$

$$= B_0(x) - \frac{A_1}{\alpha}\cos(\alpha x) + \frac{B_1}{\alpha}\sin(\alpha x) - \frac{A_2}{2\alpha}\cos(2\alpha x) + \frac{B_2}{2\alpha}\sin(2\alpha x) - \frac{A_3}{3\alpha}\cos(3\alpha x) + \dots + C$$

$(x=12) - (x=2) =$ Val.

$$= \frac{-A_i}{i\cdot\alpha}\cos(i\alpha x) + \frac{B_i}{i\cdot\alpha}\sin(i\alpha x)$$

$$\int f(x) = \int_0^3 2$$

$3\cdot 2 - 0\cdot 2$

$\cancel{x=3}$