1)

i	x_i	y_i	x_i^2	x_i^3	x_i^4	$x_i y_i$	$x_i^2 y_i$
1	-2	2	4	-8	16	-4	8
2	-1	1	1	-1	1	-1	1
3	0	0	0	0	0	0	0
4	1	1	1	1	1	1	1
5	2	2	4	8	16	4	8
Sum	0	6	10	0	34	0	18

$P_2(x) = a_0 + a_1 x + a_2 x^2$

$$\sum_{i=1}^{5} y_i = a_0 \sum_{i=1}^{5} + a_1 \sum_{i=1}^{5} x_i + a_2 \sum_{i=1}^{5} x_i^2$$

$$\sum_{i=1}^{5} x_i y_i = a_0 \sum_{i=1}^{5} x_i + a_1 \sum_{i=1}^{5} x_i^2 + a_2 \sum_{i=1}^{5} x_i^3$$

$$\sum_{i=1}^{5} x_i^2 y_i = a_0 \sum_{i=1}^{5} x_i^2 + a_1 \sum_{i=1}^{5} x_i^3 + a_2 \sum_{i=1}^{5} x_i^4$$

$6 = 5a_0 + 10\,a_2$ $\qquad a_0 = 0.343$

$0 = 10a_1$ $\qquad a_1 = 0$

$18 = 10\,a_0 + 34\,a_2$ $\qquad a_2 = 0.42857$

$12 = 10a_0 + 20a_2$

$18 = 10a_0 + 34a_2$

$-6 = -14a_2$

$a_2 = 0.42857$

maka : $P_2(x) = 0.343 + 0.42857\,x^2$

2) $f(x) = |x| \qquad [-3, 3]$

$$a_0 \int_{-3}^{3} x^0\,dx + a_1 \int_{-3}^{3} x^1\,dx + a_2 \int_{-3}^{3} x^2\,dx = \int_{-3}^{3} x^0\,(|x|)\,dx$$

$$a_0 \int_{-3}^{3} x^1\,dx + a_1 \int_{-3}^{3} x^2\,dx + a_2 \int_{-3}^{3} x^3\,dx = \int_{-3}^{3} x^1\,(|x|)\,dx$$

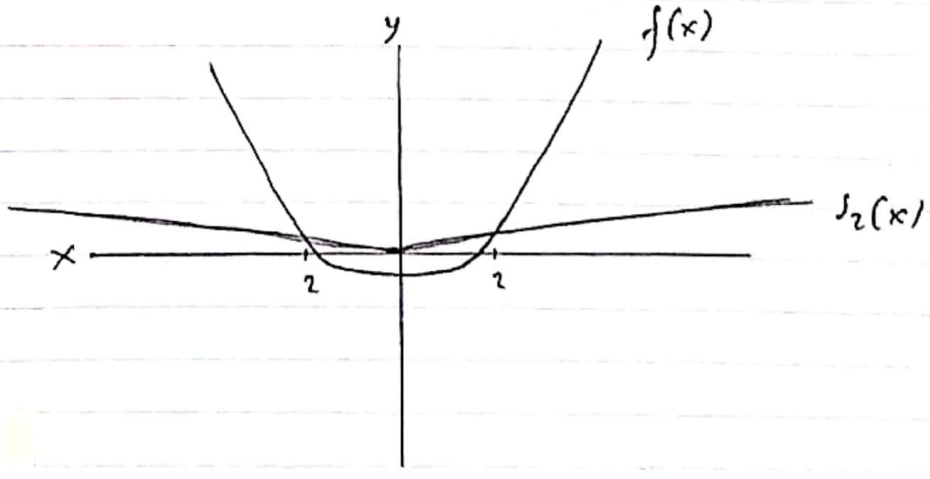
$$a_0 \int_{-3}^{3} x^2\,dx + a_1 \int_{-3}^{3} x^3\,dx + a_2 \int_{-3}^{3} x^4\,dx = \int_{-3}^{3} x^2\,(|x|)\,dx$$

$$6a_0 + 18a_2 = 9 \qquad a_0 = -2.25$$

$$18a_1 = 0 \qquad a_1 = 0$$

$$18a_0 + \frac{486}{5}a_2 = 81/2 \qquad a_2 = 1.25$$

$$S_2(x) = 1.25x^2 - 2.25$$



3) $f(x) = |x| \qquad [-\pi, \pi]$

$$S_n(x) = \frac{a_0}{2} + a_n \cos n + \sum_{k=1}^{n} \left(a_k \cos kx + b_k \sin kx \right)$$

$$a_k = \frac{1}{\pi} \int_{-\pi}^{\pi} |x| \cos kx \, dx$$

$$b_k = \frac{1}{\pi} \int_{-\pi}^{\pi} |x| \sin kx \, dx$$

$$a_0 = \frac{1}{\pi} \int_{-\pi}^{\pi} |x| \, dx = -\frac{1}{\pi} \int_{-\pi}^{0} x \, dx + \frac{1}{\pi} \int_{0}^{\pi} x \, dx = \frac{2}{\pi} \int_{0}^{\pi} x \, dx = \pi$$

$$a_k = \frac{1}{\pi} \int_{-\pi}^{\pi} |x| \cos kx \, dx = \frac{2}{\pi} \int_{0}^{\pi} x \cos kx \, dx = \frac{2}{\pi k^2} \left[(-1)^k - 1 \right]$$

$$b_k = \frac{1}{\pi} \int_{-\pi}^{\pi} |x| \sin kx \, dx = 0$$

$$S_2(x) = \frac{\pi}{2} - \frac{4}{\pi} \cos x$$