

P494. #5.

$$a. \begin{pmatrix} 10 & 54.1 \\ 54.1 & 303.39 \end{pmatrix} \begin{pmatrix} a_0 \\ a_1 \end{pmatrix} = \begin{pmatrix} 1958.4 \\ 11366.84 \end{pmatrix}$$

$$\therefore a_0 = -194.1382 \quad E = 329.0132$$

$$a_1 = 72.0845 \quad y = -194.1382 + 72.0845X$$

$$b. \begin{pmatrix} 10 & 54.1 & 303.39 \\ 54.1 & 303.39 & 1759.8 \\ 303.39 & 1759.8 & 10523.1 \end{pmatrix} \begin{pmatrix} a_0 \\ a_1 \\ a_2 \end{pmatrix} = \begin{pmatrix} 1958.4 \\ 11366.84 \\ 68006.68 \end{pmatrix}$$

$$\therefore a_0 = -1.2356 \quad E = 0.0014$$

$$a_1 = -1.1435$$

$$a_2 = 6.6182$$

$$y = -1.2356 + (-1.1435X) + 6.6182X^2$$

$$c. \begin{pmatrix} 10 & 54.1 & 303.39 & 1759.8 \\ 54.1 & 303.39 & 1759.8 & 10523 \\ 303.39 & 1759.8 & 10523 & 64608 \\ 1759.8 & 10523 & 64608 & 405616 \end{pmatrix} \begin{pmatrix} a_0 \\ a_1 \\ a_2 \\ a_3 \end{pmatrix} = \begin{pmatrix} 1958.4 \\ 11366.84 \\ 68006.68 \\ 417730.1 \end{pmatrix}$$

$$\therefore a_0 = 3.4291$$

$$a_1 = -2.3792$$

$$a_2 = 6.8456$$

$$a_3 = -0.0137$$

$$E = 5.2734 \times 10^{-4}$$

$$y = 3.4291 - 2.3792X + 6.8456X^2 - 0.0137X^3$$

$$d. \ln y = \ln b + ax$$

$$\begin{pmatrix} 10 & 54.1 \\ 54.1 & 303.39 \end{pmatrix} \begin{pmatrix} \ln b \\ a \end{pmatrix} = \begin{pmatrix} 52.033 \\ 285.49 \end{pmatrix}$$

$$\therefore a = 0.3724$$

$$\therefore E = 417.69$$

$$b = 24.2588$$

$$\therefore y = 24.2588 e^{0.3724x}$$

$$e. \ln y = \ln b + a \ln x$$

$$\begin{pmatrix} 10 & 16.6995 \\ 16.6995 & 28.2537 \end{pmatrix} \begin{pmatrix} \ln b \\ a \end{pmatrix} = \begin{pmatrix} 52.0336 \\ 87.6336 \end{pmatrix}$$

$$a = 2.0195$$

$$E = 0.007$$

$$b = 6.2390$$

$$\therefore y = 6.2390 x^{2.0195}$$

Prob. #3.

$$a. 2a_0 = \int_{-1}^1 (x^2 - 2x + 3) dx = \frac{20}{3}$$

$$a_1 = \int_{-1}^1 x(x^2 - 2x + 3) dx = \frac{4}{3}$$

$$\therefore \begin{cases} a_0 = \frac{10}{3} \\ a_1 = -2 \end{cases} \quad P_1(x) = \frac{10}{3} - 2x$$

$$b. 2a_0 = \int_{-1}^1 x^3 dx = 0$$

$$\therefore a_1 = 0$$

$$\frac{2}{3}a_1 = \int_{-1}^1 x^4 dx = \frac{2}{5}$$

$$a_2 = \frac{2}{5}$$

$$P_2(x) = \frac{2}{5}x^2$$

$$c. 2a_0 = \int_{-1}^1 \frac{1}{x+2} dx = \ln 3$$

$$\therefore a_0 = 0.5493$$

$$\frac{2}{3}a_1 = \int_{-1}^1 \frac{x}{x+2} dx = 2 - 2\ln 3$$

$$a_1 = 0.2958$$

$$P_3(x) = 0.2958x + 0.5493$$

$$d. 2a_0 = \int_{-1}^1 e^x dx = e - e^{-1}$$

$$\therefore a_0 = 1.175$$

$$\frac{2}{3}a_1 = \int_{-1}^1 x e^x dx = 2e^{-1}$$

$$a_1 = 1.103$$

$$P_4(x) = 1.103x + 1.175$$

$$e. 2a_0 = \int_{-1}^1 \frac{1}{2} \cos x + \frac{1}{3} \sin 2x dx = 0.84147$$

$$a_0 = 0.42072$$

$$\frac{2}{3}a_1 = \int_{-1}^1 x \left(\frac{1}{2} \cos x + \frac{1}{3} \sin 2x \right) dx = 0.29026$$

$$a_1 = 0.43539 \quad \therefore P_5(x) = 0.43539x + 0.42072$$

$$f. 2a_0 = \int_{-1}^1 \ln(x+2) dx = 1.2958$$

$$\therefore a_0 = 0.6479$$

$$\frac{2}{3}a_1 = \int_{-1}^1 x \ln(x+2) dx = 0.3521$$

$$a_1 = 0.52815$$

$$P_6(x) = 0.52815x + 0.6479$$

Prob. #11

$$B_1 = \frac{\int_0^\infty x e^x (x-1)^2 dx}{\int_0^\infty e^x \cdot 1 dx} = 1$$

$$B_2 = \frac{\int_0^\infty x e^x (x-1)^4 dx}{\int_0^\infty e^x (x-1)^2 dx} = 3$$

$$L_2(x) = (x-3)(x-1) = x^2 - 4x + 2$$

$$B_3 = 5 \quad G_3 = 4$$

$$L_3(x) = (x-5)(x^2 - 4x + 2) - 4(x-1) = x^3 - 9x^2 + 18x - 6$$

$$L_1(x) = x - 1$$

$$L_2(x) = x^2 - 4x + 2$$

$$L_3(x) = x^3 - 9x^2 + 18x - 6$$