В. 64. Леонтьева Полина.

(4) $p(x|\alpha) = \dfrac{\alpha}{x^{\alpha+1}}$ при $x \geq 1$.

$g(k) = \langle e^{kx} \rangle = \int_1^{\infty} p_x e^{kx} dx = \int_1^{\infty} \dfrac{\alpha e^{kx}}{x^{\alpha+1}} dx =$

$u = e^{kx} \quad du = k e^{x}$

$dv = x^{-\alpha-1} \quad v = x^{-\alpha}(-\alpha \quad = \alpha \left(\dfrac{e^{kx}(-\alpha)}{x} \right) \Big|_1^{\infty} + (\alpha) \int_1^{\infty} \dfrac{k e^{x}}{x}(\alpha)$

$\alpha - 1 \quad \{ \quad t = -x \quad dx = -dt$

$\Rightarrow \alpha e$

③ Z_1, Z_2, Z_3 - незав. $p(z) = Az \quad 0 \le z \le 2$.

$$\int_0^2 p(z)\,dz = 1 \Rightarrow \int_0^2 Az\,dz = \frac{Az^2}{2}\Big|_0^2 = \frac{4A}{2} = 2A$$

$$\Rightarrow A = \frac{1}{2}$$

$z_2 = S - z_1 \quad 0 < z_1 < 2$
$0 < S < 2 \quad 0 < S - z_1 < 2$

$$p_{S_{12}}(S) = \int_{-\infty}^{\infty} p_{z_1}(z)\, p_{z_2}(S - z) = \int_{z_1}^{z_2} \frac{1}{2} z \,\frac{1}{2}(S - z)\,dz =$$

$$= \frac{1}{4}\int_{z_1}^{2}(Sz - z^2)\,dz = \frac{1}{4}\left(\frac{Sz^2}{2} - \frac{z^3}{3}\right)\Big|_0^2\Big|_{z_1}^{z_2} = \frac{S}{2} - \frac{2}{3}$$

$$P_{S_3}(S) = \int_{z_1 0}^{z_2 2} \frac{1}{2} z\left(\frac{S}{2} - \frac{2}{3}\right)dz = \frac{Sz^2}{8} - \frac{z^2}{6}\Big|_0^2 = \frac{\cancel{4}S}{\cancel{8}2} - \frac{2}{3}$$

$S_2 + z_3 \quad z_1 0$

$$I = \lim_{n \to \infty} \frac{1}{n} \quad g(k) = \langle e^{kx} \rangle = \int_0^2 p_x e^{kx}\,dx = \int_0^2 \frac{1}{2} z e^{kz}\,dz =$$

$$= \begin{bmatrix} u = z & du = 1 \\ dv = e^{kz} & v = \frac{e^{kz}}{k} \end{bmatrix} = \frac{e^{kz} z}{k}\Big|_0^2 - \int_0^2 \frac{e^{kz}}{k}\,dz = \frac{2e^{2k}}{k} - \frac{e^{kz}}{k^2}\Big|_0^2 =$$

$$= \frac{2e^{2k}}{k} - \frac{e^{k\cancel{z}}}{k^2} + \frac{1}{k^2} \qquad -e^{2k} + 1 + 2ek$$

$$I = \max_k \left[kS - \ln\left(\frac{2e^{2k}}{k} - \frac{e^{2k}}{k^2} + \frac{1}{k^2}\right)\right] = kS$$

$$I_k = S - \frac{1}{\frac{2e^{2k}}{k} - \frac{e^{2k}}{k^2} + \frac{1}{k^2}} \left(\frac{4e^{2k}}{k} - \frac{2e^{2k}}{k^2} - \frac{2e^{2k}}{k^2} + 2\frac{e^{2k}}{k^3} - \frac{2}{k^3}\right)$$

Леонтьева Полина

② $\langle z_1^4\rangle = 12 \quad \langle z_2^6\rangle = 15. \quad \langle z_1 z_2^4\rangle = 10.$

$3\langle z_1 z_1\rangle^2 = 12.$

$\langle z_1^2\rangle = 2 = a \qquad \langle z_2^2\rangle = b \qquad \langle z_1 z_2\rangle = c.$

$\langle \check{z}_1 \check{z}_1 \check{z}_2 \check{z}_2 z_2 z_2\rangle = 10$

① 2 пары $z_1 z_2$: 2 из 4 z_2 $\binom{4}{2} = \frac{1\cdot\cancel{2}\cdot 3\cdot 4}{1\cdot\cancel{2}\cdot 1\cdot 2} = 6.$

спарить $2z_1$: $2! = 2 \Rightarrow 12$: вклад разб. $= c^2 b.$

общий вклад $12c^2b.$

② ab^2 разбить на пары $4z_2$ $(4-1)!! = 3$

$\Rightarrow$ вклад $3ab^2$

$\langle z_1^2 z_2^4\rangle = 10 = 12c^2b + 3ab^2$

$6z_2: (6-1)!! = 1\cdot 3\cdot 5 = 15 = b^3 \Rightarrow b = (15)^{\frac{1}{3}}$

$$c = \sqrt{\frac{\overset{5}{\cancel{10}} - 3ab^2}{\underset{6}{\cancel{12}} b}} = \sqrt{\frac{5}{6b} - \frac{ab}{4}} = \sqrt{\frac{5}{6\cdot\sqrt[3]{15}} - \frac{\cancel{2}\sqrt[3]{15}}{\cancel{4}2}}$$

$$\hat{C} = \begin{pmatrix} a & c \\ c & b \end{pmatrix} = \begin{pmatrix} 2 & \sqrt{\frac{5}{6\sqrt[3]{15}} - \frac{\sqrt[3]{15}}{2}} \\ \sqrt{\frac{5}{6\sqrt[3]{15}} - \frac{\sqrt[3]{15}}{2}} & \sqrt[3]{15}. \end{pmatrix}$$

(1) $\hat{C} = \begin{pmatrix} 4 & 1 \\ 1 & 2 \end{pmatrix}$ $\quad Z = X\cos\varphi + y\sin\varphi$

$V = y\cos\varphi - X\sin\varphi.$

$$P(Z \cdot V) = P(Z) \cdot P(V)$$

$$\mathbb{E}[ZV] = \mathbb{E}(Z)\,\mathbb{E}(V] = \mathbb{E}[X\cos\varphi + y\sin\varphi]\,\mathbb{E}[y\cos\varphi -$$

$$- X\sin\varphi] = (\cos\varphi\,\mathbb{E}[X] + \sin\varphi\,\mathbb{E}[y])(\cos\varphi\,\mathbb{E}[y] - \sin\varphi\,\mathbb{E}[X])$$

$$= -\sin\cos\mathbb{E}[X] - \sin^2\varphi\,\mathbb{E}[X]\,\mathbb{E}[y] + \cos^2\mathbb{E}[X$$

(3) $g(k) = \langle e^{kx} \rangle = \int_0^2 \left(\frac{S}{2} - \frac{2}{3}\right) e^{kv}\, ds = \int_0^2 \frac{S}{2} e^{ks} - \int$

$$I = S = \frac{k^2 4 e^{2k} - \cancel{k2e^{2k}} - k2e^{2k} + 2e^{2k} - 2}{2k^2 e^{2k} - ke^{2k} + k} =$$

$$I = \frac{4k^2 e^{2k} - 4ke^{2k} + 2e^{2k} - 2}{2k^2 e^{2k} - ke^{2k} + k} \quad S - \ln \quad -11-$$