

N 4.

$$(2) f(x) = \begin{cases} 0 & \text{if } 0 \leq x < \frac{3}{2}\pi \\ \sin x & \text{if } \frac{3}{2}\pi < x < \frac{5}{2}\pi \\ 0 & \text{if } x > \frac{5}{2}\pi \end{cases}$$

$$(4) P(\pi \leq X \leq \frac{5\pi}{4}) = \int_{\pi}^{\frac{5\pi}{4}} -\cos x dx = -\sin x \Big|_{\pi}^{\frac{5\pi}{4}} =$$

$$= -\sin \frac{5\pi}{4} + \sin \pi = \frac{1}{\sqrt{2}}$$

$$(5) \text{ ~~MX =~~ } MX = \int_{\pi}^{\frac{3\pi}{2}} x \cos x dx = - \int_{\pi}^{\frac{3\pi}{2}} x d(\sin x) \\ = -x \sin x \Big|_{\pi}^{\frac{3\pi}{2}} + \int_{\pi}^{\frac{3\pi}{2}} \sin x dx = -\frac{3\pi}{2} \sin\left(\frac{3\pi}{2}\right) + \pi \sin \pi - \\ - \cos x \Big|_{\pi}^{\frac{3\pi}{2}} = \frac{3\pi}{2} - \cos \frac{3\pi}{2} + \cos \pi = \frac{3\pi}{2} - 1$$

$$DX = - \int_{\pi}^{\frac{5\pi}{4}} x^2 \cos x dx - \left(\frac{3\pi}{2} - 1\right)^2$$

$$u = x^2, du = 2x dx, dv = \cos x dx, v = \sin x$$

$$= x^2 \sin x \Big|_{\pi}^{\frac{3\pi}{2}} + 2 \int_{\pi}^{\frac{3\pi}{2}} x \sin x dx - \left(\frac{3\pi}{2} - 1\right)^2 = \frac{9\pi^2}{4} + \\ + 2 \int_{\pi}^{\frac{3\pi}{2}} x \sin x dx - \left(\frac{9\pi^2}{4} - 3\pi + 1\right)$$

$$u = x, du = dx, dv = \sin x dx, v = -\cos x$$

$$\frac{9}{4}\pi - 2 \times \cos x \Big|_{\pi}^{\frac{3\pi}{2}} + 2 \int_{\pi}^{\frac{3\pi}{2}} \cos x dx = \frac{9\pi}{4} + 3\pi - 1 =$$

$$= -2\pi + 2 \sin x \Big|_{\pi}^{\frac{3\pi}{2}} + 3\pi - 1 = \pi - 1 - 2 = \pi - 3$$

5.

$$f(x) = \begin{cases} 0, & x \leq 1 \\ x-1, & 1 < x \leq 2 \\ 1, & x > 2 \end{cases}$$

$$f(x)^2 = \begin{cases} 0, & x \leq 1 \\ 1, & 1 < x \leq 2 \\ 0, & x > 2 \end{cases}$$

