6　P139

$P(0 \leqq X \leqq 2) = \int_0^2 f(x)\,dx = 1$ より

$\boxed{ア} = 1$

公式
確率変数 X の確率密度関数が $f(x)$ で
X のはんいが $\alpha \leqq X \leqq \beta$ のとき

① 常に $f(x) \geqq 0$
② $P(a \leqq X \leqq b) = \int_a^b f(x)\,dx$
③ $P(\alpha \leqq X \leqq \beta) = \int_\alpha^\beta f(x)\,dx = 1$

$\int_0^2 f(x)\,dx = 1$
$\int_0^1 f(x)\,dx + \int_1^2 f(x)\,dx = 1$
$\int_0^1 ax\,dx + \int_1^2 a(2-x)\,dx = 1$
$\left[\frac{1}{2}ax^2\right]_0^1 + \int_1^2 (2a - ax)\,dx = 1$
$\frac{1}{2}a + \left[2ax - \frac{1}{2}ax^2\right]_1^2 = 1$
$\frac{1}{2}a + 4a - 2a - (2a - \frac{1}{2}a) = 1$
$\frac{1}{2}a + 2a - 2a + \frac{1}{2}a = 1$
$a = 1$　$\boxed{イ}$

公式
$\int_a^b f(x)\,dx = \int_a^c f(x)\,dx + \int_c^b f(x)\,dx$

よって

$$f(x) = \begin{cases} x & (0 \leqq x \leqq 1) \\ 2-x & (1 \leqq x \leqq 2) \end{cases}$$

$$\begin{aligned}
P(0.5 \leqq X \leqq 1.5) &= \int_{0.5}^{1.5} f(x)\,dx \\
&= \int_{0.5}^{1} f(x)\,dx + \int_1^{1.5} f(x)\,dx \\
&= \int_{0.5}^{1} x\,dx + \int_1^{1.5} (2-x)\,dx \\
&= \left[\frac{1}{2}x^2\right]_{0.5}^{1} + \left[2x - \frac{1}{2}x^2\right]_1^{1.5} \\
&= \frac{1}{2} - \frac{1}{2}\cdot 0.25 + 3 - \frac{1}{2}\cdot 1.5^2 - \left(2 - \frac{1}{2}\right) \\
&= \cancel{\frac{1}{2}} - \frac{1}{2}\cdot\frac{25}{100} + \cancel{3} - \frac{1}{2}\cdot\left(\frac{3}{2}\right)^2 - \cancel{2} + \cancel{\frac{1}{2}} \\
&= 1 + 1 - \frac{1}{2}\cdot\frac{1}{4} - \frac{1}{2}\cdot\frac{9}{4} \\
&= 2 - \frac{1}{8} - \frac{9}{8} \\
&= \frac{16 - 1 - 9}{8} \\
&= \frac{6}{8} = \frac{3}{4} = 0.75
\end{aligned}$$

← $\boxed{ウエオ}$