第３章 2 「定積分の計算」 第３回

解答

1. (1) 36　　(2) 3

(3) $-\dfrac{4}{3}$　　(4) 15

(5) 2　　(6) $\dfrac{1}{2}(e^5-e)$

(7) $\dfrac{3}{2}$　　(8) 3

2. (1) 36　　(2) 4

解説

1. (1) $\displaystyle\int_{-1}^{3}(4x+5)dx$

$$=\Big[2x^2+5x\Big]_{-1}^{3}=36$$

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

$$=\Big[-x^3+4x\Big]_{-1}^{2}=3$$

(3) $\displaystyle\int_{0}^{1}(-x^2+4x-3)dx$

$$=\Big[-\frac{1}{3}x^3+2x^2-3x\Big]_{0}^{1}=-\frac{4}{3}$$

(4) $\displaystyle\int_{-1}^{2}(4x^3-6x^2+2x+5)dx$

$$=\Big[x^4-2x^3+x^2+5x\Big]_{-1}^{2}=15$$

(5) $\displaystyle\int_{1}^{4}\frac{1}{\sqrt{x}}dx=\Big[2\sqrt{x}\Big]_{1}^{4}=2$

(6) $\displaystyle\int_{-1}^{1}e^{2x+3}dx=\int_{-1}^{1}e^{2x}e^3dx=e^3\int_{-1}^{1}e^{2x}dx$

$$=e^3\Big[\frac{1}{2}e^{2x}\Big]_{-1}^{1}=\frac{1}{2}(e^5-e)$$

(7) $\displaystyle\int_{-\frac{\pi}{6}}^{\frac{\pi}{2}}\cos x dx=\Big[\sin x\Big]_{-\frac{\pi}{6}}^{\frac{\pi}{2}}=\frac{3}{2}$

(8) $\displaystyle\int_{0}^{\frac{\pi}{2}}(4\sin 2x+3\cos 3x)dx$

$$=\Big[-2\cos 2x+\sin 3x\Big]_{0}^{\frac{\pi}{2}}=3$$

2. (1) $x^2, 1$ は偶関数，x^3, x は奇関数だから

$$\int_{-2}^{2}(2x^3+3x^2+2x+5)dx$$

$$=2\int_{0}^{2}(3x^2+5)dx=36$$

(2) $\cos 3x$ は偶関数，$\sin 2x$ は奇関数だから

$$\int_{-\frac{\pi}{6}}^{\frac{\pi}{6}}(5\sin 2x+6\cos 3x)dx$$

$$=2\int_{0}^{\frac{\pi}{6}}6\cos 3x dx=4$$