

<7장 연습문제 정답>

연습문제 7.1

1. (a) 440

(b) 275

(c) 3245

(d) 50

(e) $\frac{7205}{6}$

(f) 465

3. (a) $\int_0^1 (3 + 5x)^3 dx$

(b) $\int_0^1 (3x - 4x^2) dx$

(c) $\int_0^1 \frac{5}{1+x} dx$

(d) $\int_0^1 \frac{1}{5x+4} dx$

(e) $\int_0^1 \frac{1}{5-2x^3} dx$

(f) $\int_0^1 x \cos x dx$

5. (a) 3

(b) -2

(c) -7

(d) 6

연습문제 7.2

1. (a) $F'(x) = x^3 + \frac{1}{x} + \tanh \sqrt{x}$

(b) $G'(x) = \sqrt[3]{x} + \frac{1}{x^2} - \ln x$

3. (a) $F'(x) = 3 \ln(3x - 1) - 2 \ln(2x - 2)$
 (b) $G'(x) = 3x^2(x^9 + x^6) - 2x(x^6 + x^4)$
 (c) $H'(x) = -\sin x \tanh(\cos x) - \cos x \tanh(\sin x)$
 (d) $I'(x) = -2\left(\frac{8 - 2x}{3 - 2x}\right) + 3\left(\frac{3 - 3x}{-2 - 3x}\right)$

5. (a) 147 (b) $\frac{3}{2} \ln \frac{11}{2}$
 (c) $\frac{1}{6} (17\sqrt{17} - 5\sqrt{5})$ (d) $\frac{2\sqrt{2}}{9} (7\sqrt{7} - 1)$
 (e) $\frac{1}{2} (e^9 - 1)$ (f) $\frac{1}{2} ((\ln 6)^2 - (\ln 4)^2)$

연습문제 7.3

1. (a) 발산 (b) 수렴
 (c) 수렴 (d) 발산

3. (a) 발산 (b) 발산
 (c) 발산 (d) 수렴

5. (a) 발산 (b) 발산
(c) 발산 (d) 발산
(e) 발산 (f) 발산

$$\begin{aligned}
 7. (a) \int_1^{\infty} \frac{1}{x^p} dx &= \lim_{t \rightarrow \infty} \int_1^t \frac{1}{x^p} dx \\
 &= \lim_{t \rightarrow \infty} \frac{1}{-p+1} x^{-p+1} \Big|_1^t \\
 &= \lim_{t \rightarrow \infty} \frac{1}{-p+1} \left(\frac{1}{t^{p-1}} - 1 \right) = \frac{1}{p-1} < \infty
 \end{aligned}$$

이므로 $\int_1^{\infty} \frac{1}{x^p} dx$ 는 수렴한다.

$$\begin{aligned}
 (b) \int_1^{\infty} \frac{1}{x^p} dx &= \lim_{t \rightarrow \infty} \int_1^t \frac{1}{x^p} dx \\
 &= \lim_{t \rightarrow \infty} \frac{1}{-p+1} x^{-p+1} \Big|_1^t \\
 &= \lim_{t \rightarrow \infty} \frac{1}{-p+1} (t^{1-p} - 1) = \infty
 \end{aligned}$$

이므로 $\int_1^{\infty} \frac{1}{x^p} dx$ 는 발산한다.