

<6장 연습문제 정답>

연습문제 6.1

1. (a) $\left(\frac{1}{3}x^3 + 2x - 7\right)' = x^2 + 2$ 이므로 $F(x)$ 는 $f(x)$ 의 원시함수이다.
 (b) $(-x^4 + 3x^3 - 11)' = -4x^3 + 9x^2$ 이므로 $G(x)$ 는 $g(x)$ 의 원시함수이다.
 (c) $(\sin x + \cos x + 4)' = \cos x - \sin x$ 이므로 $H(x)$ 는 $h(x)$ 의 원시함수이다.
 (d) $(\ln x - e^{-x} + \sqrt{2})' = \frac{1}{x} + e^{-x}$ 이므로 $K(x)$ 는 $k(x)$ 의 원시함수이다.

3. (a) $\frac{1}{3}x^3 + 2x^2 + 4x + C$ (b) $\frac{4}{3}x^3 - 6x^2 + 9x + C$
 (c) $\frac{1}{4}x^4 + \frac{1}{3}x^3 - 2x^2 - 4x + C$ (d) $\frac{3}{5}x^5 - \frac{1}{4}x^4 + 3x^2 - 2x + C$
 (e) $2 \ln |x| - \frac{3}{2x^2} + C$ (f) $\frac{2}{3}x^3 - \frac{3}{2}x^2 - x - \frac{1}{x} + C$

5. (a) $4e^x - 3x + C$ (b) $49^x \frac{1}{\ln 49} - x + C$
 (c) $12^x \frac{1}{\ln 12} + 6^x \frac{1}{\ln 6} + C$ (d) $6^x \frac{1}{\ln 6} - 3x + C$
 (e) $-\left(\frac{1}{2}\right)^x \frac{1}{\ln 2} - 2^x \frac{1}{\ln 2} + C$ (f) $\left(\frac{2}{3}\right)^x \frac{1}{\ln \frac{2}{3}} + \left(\frac{1}{3}\right)^x \frac{1}{\ln \frac{1}{3}} + C$

연습문제 6.2

1. (a) $\frac{1}{10} (x^2 + 5)^5 + C$

(b) $\frac{1}{6} (3x^3 - 1)^6 + C$

(c) $\frac{1}{9} (3x^2 + 4)^{\frac{3}{2}} + C$

(d) $-\frac{3}{8} (5 - x^4)^{\frac{4}{3}} + C$

(e) $\frac{1}{6} (4x + 5)^{\frac{3}{2}} + C$

(f) $-\frac{5}{12} (7 - 2x)^{\frac{6}{5}} + C$

(g) $-\frac{1}{8} (\cos x + 3)^8 + C$

(h) $\frac{2}{3} (\sin x + 9)^{\frac{3}{2}} + C$

3. (a) $-\frac{1}{3} \cos x^3 + C$

(b) $\frac{2}{3} \sin (x^3 - 2) + C$

(c) $\frac{1}{4} e^{x^4 + 5} + C$

(d) $-\frac{1}{4} e^{-2x^2 + 4x} + C$

(e) $\frac{1}{3} (x - 1) \sqrt{2x + 1} + C$

(f) $-\frac{4}{3} (x + 3) \sqrt{3 - 2x} + C$

(g) $\frac{2}{15} (3x^2 - 4x + 8) \sqrt{x + 1} + C$

(h) $-\frac{2}{35} (5x^3 + 6x^2 + 8x + 16) \sqrt{1 - x} + C$

5. (a) $\frac{1}{2} x \cos 2x + \frac{1}{4} (2x^2 - 1) \sin 2x + C$

(b) $(x^2 + 2) \sinh x - 2x \cosh x + C$

(c) $\frac{1}{32} (8x^2 - 4x + 1) e^{4x} + C$

(d) $-(x^3 + 3x^2 + 6x + 6) e^{-x} + C$

7. (a) $\frac{1}{2} (\ln x)^2 + C$

(b) $\ln |\ln x| + C$

(c) $\frac{1}{5} (\ln x)^5 + C$

(d) $-\frac{1}{2 (\ln x)^2} + C$

(e) $\frac{1}{2} (x \ln x - x) + C$

(f) $-\frac{\ln x}{x} - \frac{1}{x} + C$

(g) $x (\ln x)^2 - 2x \ln x + 2x + C$

(h) $\frac{1}{3} x^3 \ln x - \frac{1}{9} x^3 + C$

연습문제 6.3

1. (a) $-\frac{1}{7} \cos^7 x + \frac{2}{5} \cos^5 x - \frac{1}{3} \cos^3 x + C$

(b) $-\frac{1}{11} \cos^{11} x + \frac{2}{9} \cos^9 x - \frac{1}{7} \cos^7 x + C$

(c) $\frac{1}{7} \cos^7 x - \frac{1}{5} \cos^5 x + C$

(d) $-\frac{1}{9} \cos^9 x + C$

(e) $\frac{1}{3} \cos^3 x - \cos x + C$

(f) $-\frac{1}{5} \cos^5 x + \frac{2}{3} \cos^3 x - \cos x + C$

3. (a) $\frac{1}{4} \sin^4 x + C$

(b) $-\frac{1}{4} \cos^4 x + C$

(c) $\frac{1}{6} \sin^6 x + C$

(d) $-\frac{1}{6} \cos^6 x + C$

(e) $\frac{1}{8} \sin^8 x - \frac{1}{3} \sin^6 x + \frac{1}{4} \sin^4 x + C$ 또는 $\frac{1}{8} \cos^8 x - \frac{1}{6} \cos^6 x + C$

(f) $-\frac{1}{8} \sin^8 x + \frac{1}{6} \sin^6 x + C$ 또는 $-\frac{1}{8} \cos^8 x + \frac{1}{3} \cos^6 x - \frac{1}{4} \cos^4 x + C$

5. (a) $-\frac{1}{22} \cos 11x - \frac{1}{14} \cos 7x + C$ (b) $-\frac{1}{14} \cos 7x + \frac{1}{2} \cos x + C$

(c) $-\frac{1}{20} \cos 10x + \frac{1}{8} \cos 4x + C$ (d) $-\frac{1}{14} \cos 7x + \frac{1}{10} \cos 5x + C$

(e) $-\frac{1}{16} \sin 8x + \frac{1}{4} \sin 2x + C$ (f) $\frac{1}{20} \sin 10x + \frac{1}{4} \sin 2x + C$

연습문제 6.4

1. (a) $\frac{1}{5} \ln |5x+2| + C$

(b) $\frac{2}{3} \ln |9x+1| + C$

(c) $\frac{2}{5} \ln |5x-7| + C$

(d) $-\frac{3}{4} \ln |3-4x| + C$

(e) $\frac{1}{2} \ln |x^2+5| + C$

(f) $\frac{3}{2} \ln |x^2-4| + C$

(g) $\frac{1}{3} \ln |x^3-2| + C$

(h) $\frac{3}{4} \ln |x^4+4| + C$

3. (a) $\ln |x - 4| - \ln |x - 3| + C$ (b) $\frac{2}{7} (\ln |x - 5| - \ln |x + 2|) + C$
- (c) $\frac{5}{4} \ln |x + 4| - \frac{1}{4} \ln |x| + C$ (d) $\frac{7}{2} \ln |x - 2| - \frac{3}{2} \ln |x| + C$
- (e) $\frac{1}{4} (\ln |x - 2| - \ln |x + 2|) + C$ (f) $\frac{4}{3} \ln |x - 3| - \frac{1}{3} \ln |x + 3| + C$

5. (a) 5개 (b) 7개
- (c) 3개 (d) 8개
- (e) 5개 (f) 13개