110331006 蘇秉章翰

[6-8]

8. $\lim\limits_{x\to 3}\frac{x-3}{x^2-9} = \lim\limits_{x\to 3}\frac{f'(x)}{g'(x)} = \lim\limits_{x\to 3}\frac{1}{2x} = \frac{1}{6}$ #

12. $\lim\limits_{x\to 4}\frac{x^{\frac{1}{2}}-2}{x-4} = \lim\limits_{x\to 4}\frac{\frac{1}{2}x^{-\frac{1}{2}}}{1} = \frac{1}{2\sqrt{4}} = \frac{1}{4}$ #

15. $\lim\limits_{t\to 0}\frac{e^{2t}-1}{\sin t} = \lim\limits_{t\to 0}\frac{2\times e^{2t}}{\cos t} = \frac{2e^0}{\cos(0)} = \frac{2}{1} = 2$

27. $\lim\limits_{x\to 0}\frac{e^x+e^{-x}-2}{e^x-x-1} = \lim\limits_{x\to 0}\frac{e^x+e^{-x}x(-1)-0}{e^x-1} = \lim\limits_{x\to 0}\frac{e^x-e^{-x}}{e^x-1}$ l's again

$= \lim\limits_{x\to 0}\frac{e^x+e^{-x}}{e^x} = \frac{2}{1}$

$= 2$ #

63.

$L = \lim\limits_{x\to\infty} x^{\frac{1}{x}}$

$\ln L = \lim\limits_{x\to\infty}\ln(x^{\frac{1}{x}})$

$= \lim\limits_{x\to\infty}\frac{\ln(x)}{x}$

$= \lim\limits_{x\to\infty}\frac{\frac{d}{dx}\ln x}{\frac{d}{dx}x}$

$= \lim\limits_{x\to\infty}\frac{\frac{1}{x}}{1}$

$= \lim\limits_{x\to\infty}\frac{1}{x} = 0.$ $L = e^0$

$\because \ln L = 0$ $\therefore L = 1$ #

[7-1] 3. $du = dx$

$v = \frac{\sin(4x)}{4}$

$\int u\,dv = uv - \int v\,du$

$x\times\frac{\sin(4x)}{4} - \int\frac{\sin(4x)}{4}dx$ $t = 4x$

$dt = 4dx$

$= x\times\frac{\sin(4x)}{4} - \frac{1}{4}\int\sin(4x)dx$ $dx = \frac{1}{4}dt$

$= x\times\frac{\sin(4x)}{4} - \frac{1}{4}\int\sin(t)\frac{1}{4}dt$

$= x\times\frac{\sin(4x)}{4} - \frac{1}{16}\times(-\cos(4x))$

$= \frac{x\times\sin(4x)}{4} + \frac{\cos(4x)}{16} + C$ #

[7-1] 7.

$$\int x \sin 10x \, dx \qquad u = x \quad du = dx \quad dv = \sin 10x \, dx \quad v = \frac{-\cos(10x)}{10}$$

$$\int u \, dv = uv - \int v \, du$$

$$x \times \frac{-\cos(10x)}{10} - \int \frac{-\cos(10x)}{10} dx$$

$$= x \times \frac{-\cos(10x)}{10} - \frac{1}{10} \times \frac{-1}{10} \times \sin(10x)$$

$$= x \times \frac{-\cos(10x)}{10} + \frac{1}{100} \times \sin(10x) + C$$

15.

$$\int \ln t \; t^4 dt$$

$$u = \ln(t) \quad du = \frac{1}{t} dt$$

$$dv = t^4 dt \quad v = \frac{t^5}{5}$$

$$\int u \, dv = vu - \int v \, du$$

$$\ln(t) \times \frac{t^5}{5} - \int \frac{t^5}{5} \times \frac{1}{t} dt$$

$$= \ln(t) \times \frac{t^5}{5} - \int \frac{t^4}{5} dt$$

$$= \ln(t) \times \frac{t^5}{5} - \frac{1}{5} \int t^4 dt$$

$$= \ln(t) \times \frac{t^5}{5} - \frac{1}{5} \times \frac{t^5}{5}$$

$$= \ln(t) \times \frac{t^5}{5} - \frac{t^5}{5 \times 5}$$

$$= \ln(t) \times \frac{t^5}{5} - \frac{t^5}{25} + C$$

29.

$$\int x \times 3^x dx \qquad u = x \quad du = dx \quad dv = 3^x dx \quad v = \frac{3^x}{\ln(3)}$$

$$\int u \, dv = uv - \int v \, du$$

$$x \times \frac{3^x}{\ln 3} - \int \frac{3^x}{\ln 3} dx$$

$$x \times \frac{3x}{\ln(3)} - \frac{1}{\ln(3)} \times \frac{1}{\ln(3)} \times 3^x \Big|_0^1$$

$$= \frac{3}{\ln(3)} - \frac{3}{\ln(3)^2} - \left(0 - \frac{1}{\ln(3)^2}\right)$$

$$= \frac{3}{\ln(3)} - \frac{3}{\ln(3)^2} + \frac{1}{\ln(3)^2}$$

$$= \frac{3}{\ln(3)} - \frac{2}{\ln(3)^2}$$

110321006 [illegible]

[7-1] 47

$u = x \qquad dv = \ln(1+x)\,dx$

$du = dx \qquad V =$

[7-1] 57

[7-2] 1 $\quad t = \cos(x) \qquad t' = -\sin(x) \qquad dx = \frac{1}{-\sin(x)}\,dt$

$$\int -t^2 + t^4\,dt$$

$$= -\frac{t^3}{3} + \frac{t^5}{5}$$

$$= \frac{-\cos(x)^3}{3} + \frac{\cos(x)^5}{5} + C$$

5. $\quad u = \cos(2t)$

$$\int -\frac{u^2 - 2u^4 + u^6}{2}\,du$$

$$= -\frac{1}{2} \times \left(\int u^2\,du - \int 2u^4\,du + \int u^6\,du\right)$$

$$= -\frac{1}{2} \times \left(\frac{u^3}{3} - \frac{2u^5}{5} + \frac{u^7}{7}\right)$$

$$= \frac{-\cos(2t)^3}{6} + \frac{\cos(2t)^5}{5} - \frac{\cos(2t)^7}{14}$$

[7-2] 15.

$\sec(t) = \frac{1}{\cos(t)}$

$\int \sin(x) \times \left(\frac{1}{\cos(x)}\right)^5 dx$

$= \int \frac{\sin(x)}{\cos(x)^5} dx$

$= \int -\frac{1}{t^5} dt$

$= -\left(-\frac{1}{4t^4}\right)$

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

21. $t = \sec(x)^3$

$\int \frac{1}{3} dt$

$= \frac{1}{3} t$

$= \frac{1}{3} \sec(x)^3$

$= \frac{\sec(x)^3}{3} + C$

23、 $\tan(t)^2 = \sec(t)^2 - 1$

$\int \sec(x)^2 - 1 \, dx = \int \sec(x^2) \, dx - x$

$= \tan(x) - x + C$ #

(7-3) 5.

[7-3] 7.

(7-3] 11.