

ver. 20220629

著 : 雀

sukital729@gmail.com

[1 ~ 100] 다음 정적분의 값을 구하시오.

1.

$$\int_0^{\pi} \frac{x \sin x}{3 + \sin^2 x} dx$$

$$\frac{\pi}{4} \ln 3$$

2.

$$\int_0^{\frac{\pi}{2}} \frac{\sin x}{\sin x + \cos x} dx$$

$$\frac{\pi}{4}$$

3.

$$\int_0^{\frac{\pi}{2}} \frac{\cos^{\sqrt{5}} x}{\sin^{\sqrt{5}} x + \cos^{\sqrt{5}} x} dx$$

$$\frac{\pi}{4}$$

4.

$$\int_0^{\frac{\pi}{4}} \frac{\sin x}{\sin x + \cos x} dx$$

$$\frac{\pi}{8} - \frac{1}{4} \ln 2$$

5.

$$\int_0^8 \frac{x^3 - 2x + 1}{\sqrt[3]{x}} dx$$

6.

$$\int_{-3}^3 \frac{2x^2}{2^x + 1} dx$$

7.

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\cos x}{e^{1/x} + 1} dx$$

8.

$$\int_0^{\frac{\pi}{2}} \sin 3x \cos 4x dx$$

9.

$$\int_0^{\frac{\pi}{2}} \sqrt[3]{\tan x} dx$$

$$\frac{\pi}{\sqrt{3}}$$

10.

$$\int_0^{\frac{\pi}{4}} \sqrt[3]{\tan x} dx$$

$$\frac{\sqrt{3}}{6} \pi - \frac{1}{2} \ln 2$$

11.

$$\int_0^1 \frac{1}{x^x} dx$$

(급수의 형태로 나타내어도 무방함.)

12.

$$\int_0^1 \frac{1}{1 + \left(1 - \frac{1}{x}\right)^{2022}} dx$$

$$\sum_{n=1}^{\infty} \frac{1}{n^n}$$

$$\frac{1}{2}$$

13.

$$\int_{-\infty}^{\infty} e^{-x^2} dx$$

$\sqrt{\pi}$

14.

$$\int_{-\infty}^{\infty} \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-\mu)^2}{2\sigma^2}} dx$$

1

15.

$$\int_0^{\infty} 4\pi r^2 |\psi(r)|^2 dr \quad (\psi(r) = \frac{1}{\sqrt{\pi a_0^3}} e^{-\frac{r}{a_0}})$$

16.

$$\int_{\frac{a_0}{2}}^{\infty} 4\pi r^2 |\psi(r)|^2 dr \quad (\psi(r) = \frac{1}{\sqrt{\pi a_0^3}} e^{-\frac{r}{a_0}})$$

17.

$$\int_0^{\frac{\pi}{2}} \sin^{10} x dx$$

$$\frac{63\pi}{512}$$

18.

$$\int_0^1 \frac{x^{2022} - 1}{\ln x} dx$$

$$\ln 2023$$

19.

$$\int_0^1 \frac{\ln x}{x-1} dx$$

$$\frac{\pi^2}{6}$$

20.

$$\int_{-\infty}^{\infty} \frac{\sin x}{x} dx$$

$$\pi$$

21.

$$\int_{-\infty}^{\infty} \frac{\sin^2 x}{x^2} dx$$

π

22.

$$\int_0^1 \sqrt[3]{2x^3 - 3x^2 - x + 1} dx$$

0

23.

$$\int_0^1 \frac{\ln(x+1)}{x^2+1} dx$$

$$\frac{\pi}{8} \ln 2$$

24.

$$\int_0^2 \frac{\ln(x+1)}{x^2-x+1} dx$$

$$\frac{\pi \ln 3}{2\sqrt{3}}$$

25.

$$\int_0^1 \frac{\ln(x^2 + 1)}{x + 1} dx$$

$$\frac{3}{4}(\ln 2)^2 - \frac{\pi^2}{48}$$

26.

$$\int_0^{\frac{\pi}{2}} \ln(\cos x) dx$$

$$-\frac{1}{2}\pi \ln 2$$

27.

$$\int_0^1 \frac{\ln x}{x+1} dx$$

$$-\frac{\pi^2}{12}$$

28.

$$\int_0^{\frac{\pi}{2}} \cos^{2022} x \cos 2022x dx$$

$$\frac{\pi}{2^{2023}}$$

29.

$$\int_0^1 (\ln x)^{2022} dx$$

2022!

30.

$$\int_1^e \frac{\ln x}{\sqrt{x}} dx$$

$4 - 2\sqrt{e}$

31.

$$\int_0^{\frac{\pi}{2}} \ln(2 + \tan^2 x) dx$$

$$\pi \ln(\sqrt{2} + 1)$$

32.

$$\int_0^{\infty} \frac{x - \sin x}{x^3(x^2 + 4)} dx$$

$$\frac{\pi}{32}(1 - e^{-2})$$

33.

$$\int_0^\pi \frac{1 - \sin x}{1 + \sin x} dx$$

 $4 - \pi$

34.

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

 $2e^{\frac{3}{5}} - 1$

35.

$$\int_0^{\frac{\pi}{2}} \sin 2022x \cdot \sin^{2020} x dx$$

$$\frac{1}{2021}$$

36.

$$\int_1^{\sqrt{2}} \frac{x^4 - 1}{x^2 \sqrt{x^4 - x^2 + 1}} dx$$

$$\frac{\sqrt{6}}{2} - 1$$

37.

$$\int_0^{\frac{\pi}{3}} \frac{\sin 2x}{2 + \cos x} dx$$

$$1 - \ln\left(\frac{1296}{625}\right)$$

38.

$$\int_0^{\frac{\pi}{4}} \tan^9 x dx$$

$$\frac{1}{2} \ln 2 - \frac{7}{24}$$

39.

$$\int_0^1 \frac{x-1}{(1+x^3)\ln x} dx$$

$$\frac{\ln 3}{2}$$

40.

$$\int_0^{\frac{\pi}{2}} \frac{(1+\sec^2 t)\sqrt{\sec t}}{(1+\sec t)^2-2} dt$$

$$\frac{\pi}{\sqrt{2}}$$

41.

$$\int_0^{\frac{\pi}{2}} \frac{\cos x}{2 - \sin 2x} dx$$

$\frac{\pi}{4}$

42.

$$\int_0^{\infty} (\ln(e^x + 1) - x) dx$$

$\frac{\pi^2}{12}$

43.

$$\int_0^{\infty} \frac{x}{e^x + 1} dx$$

$$\frac{\pi^2}{12}$$

44.

$$\int_0^{\frac{\pi}{2}} \frac{\ln(\tan x)}{1 - \tan x + \tan^2 x} dx$$

$$-\frac{7\pi^2}{72}$$

45.

$$\int_{-\infty}^{\infty} \frac{\cos\left(x - \frac{1}{x}\right)}{1+x^2} dx$$

$$\frac{\pi}{e^2}$$

46.

$$\int_0^{\infty} \frac{\cos x}{x^2+1} dx$$

$$\frac{\pi}{2e}$$

47.

$$\int_0^{\infty} \frac{x \sin x}{x^2 + 1} dx$$

$$\frac{\pi}{2e}$$

48.

$$\int_0^{\infty} \frac{\ln(1+x)}{x(x^2+1)} dx$$

$$\frac{5\pi^2}{48}$$

49.

$$\int_0^{\frac{\pi}{2}} \frac{\sin(u + \sqrt{\pi} \tan u)}{\sin u} du$$

 $\frac{\pi}{2}$

50.

$$\int_0^{\pi} \sin^2(x - \sqrt{\pi^2 - x^2}) dx$$

 $\frac{\pi}{2}$

51.

$$\int_0^{\infty} e^{-x^2} \cos 2x dx$$

$$\frac{\sqrt{\pi}}{2e}$$

52.

$$\int_0^{\frac{\pi}{2}} \cos(\tan x) dx$$

$$\frac{\pi}{2e}$$

53.

$$\int_0^{\frac{\pi}{2}} \frac{x}{\tan x} dx$$

$$\frac{\pi}{2} \ln 2$$

54.

$$\int_0^{\pi} \ln(1 - 2e \cos x + e^2) dx$$

$$2\pi$$

55.

$$\int_0^{\pi} \ln(1 + \sin^2 t) dt$$

$$2\pi \ln\left(\frac{1 + \sqrt{2}}{2}\right)$$

56.

$$\int_0^4 \frac{\ln x}{\sqrt{4x - x^2}} dx$$

0

57.

$$\int_0^{\infty} \frac{1}{(1+x^2)(1+x^\pi)} dx$$

 $\frac{\pi}{4}$

58.

$$\int_0^{\infty} \frac{1}{(1+x)(\pi^2 + (\ln x)^2)} dx$$

 $\frac{1}{2}$

59.

$$\int_0^{\infty} \frac{x-1}{\sqrt{2^x-1} \ln(2^x-1)} dx$$

$$\frac{\pi}{2(\ln 2)^2}$$

60.

$$\int_0^{3\pi} \frac{1}{\sin^4 x + \cos^4 x} dx$$

$$3\sqrt{2}\pi$$

61.

$$\int_0^{\pi} \cos^4 x dx$$

$$\frac{3}{8} \pi$$

62.

$$\int_0^{\frac{\pi}{2}} \sin^6 x \cos^3 x dx$$

$$\frac{2}{63}$$

63.

$$\int_0^{\frac{\pi}{4}} \sin^3 x \sec^2 x dx$$

$$\frac{3\sqrt{2}}{2} - 2$$

64.

$$\int_1^3 \frac{1}{x^2 \sqrt{x^2 + 4}} dx$$

$$\frac{3\sqrt{5} - \sqrt{13}}{12}$$

65.

$$\int_{\sqrt{3}-1}^{2\sqrt{2}-1} \frac{1}{(x+1)\sqrt{x^2+2x+2}} dx$$

$$\ln \sqrt{\frac{3}{2}}$$

66.

$$\int_0^{\tan^{-1}(\sqrt{6})} \frac{1}{1+\cos^2 x} dx$$

$$\frac{\sqrt{2}}{6} \pi$$

67.

$$\int_0^{\frac{\pi}{2}} \frac{1}{1 + \cos x} dx$$

1

68.

$$\int_{\ln(e-1)}^{\ln(e^3-1)} \frac{e^x \ln(e^x + 1)}{e^x + 1} dx$$

4

69.

$$\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} \frac{1}{\sin x} dx$$

$$\ln \sqrt{3}$$

70.

$$\int_0^{\frac{\pi}{4}} \frac{1}{1-3\cos^2 x} dx$$

$$\frac{1}{\sqrt{2}} \ln(\sqrt{2}-1)$$

71.

$$\int_{-1}^0 \frac{x^3 - x - 2}{x^3 - x^2 + x - 1} dx$$

72.

$$\int_3^4 \frac{x + 4}{x^3 + 3x^2 - 10x} dx$$

73.

$$\int_5^6 \frac{7x^3 - 13x^2 - 24x + 24}{x^4 - 3x^3 - 10x^2 + 24x} dx$$

$$\ln\left(\frac{81}{5}\right)$$

74.

$$\int_1^2 \frac{1}{x^2 \sqrt{2x - x^2}} dx$$

$$\frac{2}{3}$$

75.

$$\int_1^e \frac{x^4 + 81}{x(x^2 + 9)^2} dx$$

$$\frac{e^2 + 99}{10(e^2 + 9)}$$

76.

$$\int_0^3 \sqrt{\frac{4-x}{x}} dx$$

$$\sqrt{3} + \frac{4}{3}\pi$$

77.

$$\int_0^{\frac{1}{\sqrt[3]{2}}} \sqrt{\frac{x}{1-x^3}} dx$$

$$\frac{\pi}{6}$$

78.

$$\int_0^{\frac{3}{4}} \sqrt{x} \sqrt{1-x} dx$$

$$\frac{\sqrt{3}}{32} + \frac{\pi}{12}$$

79.

$$\int_0^{\tan^{-1}(\sqrt{3})} \frac{\sin x \cos x}{\sin^4 x + \cos^4 x} dx$$

 $\frac{\pi}{6}$

80.

$$\int_0^{\frac{\pi}{4}} \tan^4 x \sec^4 x dx$$

 $\frac{12}{35}$

81.

$$\int_2^4 \frac{x\sqrt{x-1}}{x-\sqrt{x}} dx$$

$$\frac{34-10\sqrt{2}}{3}$$

82.

$$\int_0^{\ln 3} \frac{1}{\sqrt{1+e^x}} dx$$

$$-\ln(9-6\sqrt{2})$$

83.

$$\int_1^2 \frac{x^2 + 2x - 1}{2x^3 + 3x^2 - 2x} dx$$

$$\frac{1}{10} \ln 72$$

84.

$$\int_0^{\frac{\pi}{3}} 13e^{2x} \cos 3x dx$$

$$-2(e^{2\pi/3} + 1)$$

85.

$$\int_0^{\pi} e^{-x} \sin^2 2x dx$$

$$\frac{8}{17}(1 - e^{-\pi})$$

86.

$$\int_0^{\frac{\pi}{4}} \sqrt{\tan x} dx$$

$$\frac{\pi}{2\sqrt{2}} + \frac{1}{\sqrt{2}} \ln(\sqrt{2} - 1)$$

87.

$$\int_0^{\frac{\pi}{4}} \sqrt{\tan x} \sqrt{1 - \tan x} dx$$

88.

$$\int_1^{\infty} \frac{(\ln x)^{627}}{x^{2022}} dx$$

$$\left(\sqrt{\frac{1 + \sqrt{2}}{2}} - 1 \right) \pi$$

$$\frac{627!}{2021^{628}}$$

89.

$$\int_0^{\sqrt{6}} \cos^2(\tan^{-1}(\sin(\cot^{-1}x))) dx$$

$$\sqrt{6} - \frac{\pi}{3\sqrt{2}}$$

90.

$$\int_0^{\frac{\pi}{6}} \frac{\sec^2 x}{(\sec x + \tan x)^{5/2}} dx$$

$$-\frac{8}{63} \sqrt[4]{3} + \frac{10}{21}$$

91.

$$\int_1^2 \frac{1}{x \sqrt{x^2 + 4x - 4}} dx$$

 $\frac{\pi}{8}$

92.

$$\int_1^{\frac{25}{73}} \frac{1}{x \sqrt{-x^2 + x + 2}} dx$$

 $\sqrt{2} \ln \frac{3}{5}$

93.

$$\int_1^2 \frac{x^2}{\sqrt{-x^2+3x-2}} dx$$

$$\frac{19}{8}\pi$$

94.

$$\int_0^{\frac{\pi}{4}} \frac{\sin^3(\theta/2)}{\cos(\theta/2) \cdot \sqrt{\cos^3\theta + \cos^2\theta + \cos\theta}} d\theta$$

$$\frac{1}{2} \sin^{-1}(9-6\sqrt{2}) - \frac{\pi}{12}$$

95.

$$\int_0^{\frac{\pi}{6}} \frac{\tan^4 \theta}{1 - \tan^2 \theta} d\theta$$

$$-\frac{1}{\sqrt{3}} + \frac{\pi}{12} + \frac{1}{4} \ln(2 + \sqrt{3})$$

96.

$$\int_{-\infty}^{\infty} \frac{x^2}{x^4 + 1} dx$$

$$\frac{\pi}{\sqrt{2}}$$

97.

$$\int_0^{\infty} \exp\left(-x^2 - \frac{1}{x^2}\right) dx$$

$$\frac{\sqrt{\pi}}{2e^2}$$

98.

$$\int_0^1 \frac{1-x^{99}}{(1+x)(1+x^{100})} dx$$

$$\frac{99}{100} \ln 2$$

99.

$$\int_{-\infty}^{\infty} \exp\left(-\frac{(x^2-13x-1)^2}{611x^2}\right) dx$$

$$\sqrt{611\pi}$$

100.

$$\int_0^{\frac{\pi}{2}} \sqrt[n]{\tan x} dx \quad (2 \leq n \in \mathbb{N})$$

$$\frac{\pi}{2} \sec\left(\frac{\pi}{2n}\right)$$