ver. 20221003
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[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.

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

$\frac{28938}{55}$

6.

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

18

7.

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

1

8.

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

$$-\frac{3}{7}$$

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.)

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

12.

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

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

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.

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

1

16.

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

$$\frac{5}{2e}$$

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.

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

$\frac{\pi}{2}$

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.

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

2π

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.

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

1

72.

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

$$\frac{2}{35}\ln\left(\frac{729}{32}\right)$$

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.

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

$\frac{\pi}{6}$

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.

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

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

88.

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

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

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.

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

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