

1.

$$\int_0^{2\pi} \cos(2x) \, dv$$

Answer: $\boxed{2\pi \cos(2x)}$

2.

$$\int_{-1/2}^{3/4} \arccos(x) + \arcsin(x) \, dx$$

Answer: $\boxed{\frac{5\pi}{8}}$

3.

$$\int_0^\infty x^4 e^{-x} \, dx$$

Answer: $\boxed{24}$

4.

$$\int_0^1 \frac{x^6}{x^2 + 1} \, dx$$

Answer: $\boxed{\frac{13}{15} - \frac{\pi}{4}}$

5.

$$\int_0^{\sinh(1)} \sinh^{-1}(x) \, dx$$

Answer: $\boxed{\sinh(1) - \cosh(1) + 1 = 1 - \frac{1}{e}}$

6.

$$\int_0^{\sqrt[4]{15}} \sqrt[4]{x^{16} + x^{12}} \, dx$$

Answer: $\boxed{\frac{31}{5}}$

7.

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

Answer: $\boxed{\frac{2}{5}}$

8.

$$\int_1^2 x \operatorname{arcsec}(x) \, dx$$

Answer: $\boxed{\frac{2\pi}{3} - \frac{\sqrt{3}}{2}}$

9.

$$\int_0^\pi \cos^6(x) \, dx$$

Answer: $\boxed{\frac{5\pi}{16}}$

10.

$$\int_1^\infty \frac{x+1}{x^3+x} \, dx$$

Answer: $\boxed{\frac{\pi}{4} + \frac{\ln(2)}{2}}$

11.

$$\int_1^4 e^{2x} \left(2 \ln(x) + \frac{1}{x} \right) \, dx$$

Answer: $\boxed{e^8 \ln(4)}$

12.

$$\int_0^{\pi/4} \frac{\sin(x) + 8 \cos(x)}{2 \sin(x) + \cos(x)} \, dx$$

Answer: $\boxed{\frac{\pi}{2} + 3 \ln \left(\frac{3\sqrt{2}}{2} \right)}$

13.

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

Answer: $\boxed{0}$

14.

$$\int_0^{\pi/2} \frac{\sin^2(x)}{1 + \sin(2x)} \, dx$$

Answer: $\boxed{\frac{1}{2}}$

15.

$$\int_0^{45} \frac{2x - x^2}{x^2 + 2025e^x} \, dx$$

Answer: $\boxed{\ln \left(1 + \frac{1}{e^{45}} \right) = \ln(e^{45} + 1) - 45}$

16.

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

Answer: $\boxed{\sqrt{\pi}}$

17.

$$\int_0^{\infty} \sin(x^2) dx$$

Answer: $\boxed{\frac{\sqrt{2\pi}}{4}}$

18.

$$\int_0^{\pi/2} \frac{9 \sin(x) + 5 \cos(x)}{\sin(x) + \cos(x)} dx$$

Answer: $\boxed{\frac{7\pi}{2}}$

19.

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

Answer: $\boxed{\frac{\pi^2}{24}}$

20. (Tiebreaker) Estimate:

$$\int_0^1 \frac{e^{\arctan(x)}}{x+1} dx$$

Answer: $\boxed{1.05447\dots}$