

1. Evaluate the integral $\int (x \ln x)^2, dx$.
2. Evaluate the integral $\int \sin^2 5x \cos^2 5x dx$.
3. Evaluate the integral $\int_0^1 \frac{e^{2x}}{e^{2x} + 1}, dx$.
4. Evaluate the integral $\int \frac{5x^3 + 2x^2 - 12x - 8}{x^4 - 8x^2 + 16}, dx$.
5. Evaluate the integral $\int \frac{1}{x\sqrt{4 - 9x^2}} dx$.
6. Determine whether or not the improper integral converges. If it converges, find its value.

$$\int_0^{\pi} \sec^2 x dx$$

ANSWERS:

1. $\frac{x^3(\ln x)^2}{3} - \frac{2x^3 \ln x}{9} + \frac{2x^3}{27} + C$
 2. $\frac{x}{8} - \frac{\sin 20x}{160} + C$
 3. $\frac{1}{2} \ln\left(\frac{e^2+1}{2}\right)$
 4. $-\frac{1}{x-2} + 3 \ln |x-2| + \frac{1}{x+2} + 2 \ln |x+2| + C$
 5. $-\frac{1}{2} \ln \left| \frac{2}{3x} + \frac{\sqrt{4-9x^2}}{3x} \right| + C$
 6. The integral is divergent.
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