

Use basic integration rules to integrate:

1. $\int x\sqrt{x^2 - 1}dx$

2. $\int \frac{\ln(2x)}{x}dx$

Use integration by parts to integrate

1. $\int x\sqrt{x - 5}dx$

2. $\int x^2 \sin(2x)dx$

3. $\int e^{2x} \sin(3x)dx$

Evaluate the following trigonometric integrals

1. $\int \sin^2(x)dx$

2. $\int \cos^3(x) \sin(x)dx$

Use trigonometric substitution to evaluate the following integrals

1. $\int \frac{-12}{x^2\sqrt{4-x^2}}dx$

2. $\int \sqrt{9 - 4 * x^2}dx$

Use partial fraction decomposition to integrate:

1. $\int \frac{x-28}{x^2-x-6}dx$

2. $\int \frac{2}{x^2-x}dx$

Use l'Hospital's rule, or any other method, to evaluate the following limits:

1. $\lim_{x \rightarrow 1} \frac{(\ln(x))^2}{x-1}$

2. $\lim_{x \rightarrow 0} \frac{e^{2x}}{x^2}$

3. $\lim_{x \rightarrow \infty} \frac{x^2-1}{1-2x^2}$

4. $\lim_{x \rightarrow \infty} x e^{-x^2}$

5. $\lim_{x \rightarrow 1^+} \frac{2}{\ln(x)} - \frac{2}{x-1}$

Determine whether the improper integral converges or diverges. Evaluate the integral if it converges.

1. $\int_0^1 6 \frac{1}{x^{1/4}} dx$

2. $\int_0^1 \frac{6}{x-1} dx$

3. $\int_1^\infty x^2 \ln(x) dx$

4. $\int_0^\infty \frac{e^{-1/x}}{x^2} dx$