

Math 1552, Integral Calculus

Section 8.5: Partial Fractions

Evaluate the following integrals using any method we have learned.

1. $\int \frac{x-1}{(x+1)^3} dx$

2. $\int x^5 \ln(x) dx$

3. $\int \tan(x) \ln[\cos(x)] dx$

4. $\int \frac{x+2}{x+1} dx$

5. $\int \sqrt{25-x^2} dx$

6. $\int \tan^3(x) \sec^4(x) dx$

7. $\int x \tan^{-1}(x) dx$

8. $\int \frac{dx}{x\sqrt{1+x^2}}$

9. $\int \frac{x+1}{x^2(x-1)} dx$

Answers

1. $-\frac{1}{x+1} + \frac{1}{(x+1)^2} + C$ (partial fractions)
2. $\frac{x^6 \ln x}{6} - \frac{x^6}{36} + C$ (by parts)
3. $-\frac{1}{2}(\ln[\cos(x)])^2 + C$ (u-substitution)
4. $x + \ln|x+1| + C$ (long division)
5. $\frac{25}{2} \sin^{-1}\left(\frac{x}{5}\right) + \frac{x\sqrt{25-x^2}}{2} + C$ (trig sub)
6. $\frac{1}{4} \tan^4(x) + \frac{1}{6} \tan^6(x) + C$ (trig identities)
7. $\frac{x^2}{2} \tan^{-1}(x) - \frac{x}{2} + \frac{1}{2} \tan^{-1}(x) + C$ (by parts)
8. $-\ln\left|\frac{\sqrt{1+x^2}}{x} + \frac{1}{x}\right| + C$ (trig sub)
9. $-2 \ln|x| + \frac{1}{x} + 2 \ln|x-1| + C$ (partial fractions)