Section 7.4

Penn State University

Math 141 - Section 001 - Summer 2016

7.4: Integration of Rational Functions by Partial Fractions

The main idea of this section is to reduce integrals of a rational function (i.e. products and quotients of polynomials) to familiar integrals such as $\int \frac{1}{x}dx$, $\int \frac{x}{x^2+1}dx$, $\int \frac{1}{x^2+1}dx$, and so on.

Exercise 1. (Ex1) $\int \frac{x^3+x}{x-1}dx$

Exercise 2. (Ex2) $\int \frac{x^2+2x-1}{2x^3+3x^2-2x}dx$

Exercise 3. $\int \frac{dx}{x^2-3x+2}$

Exercise 4. (Ex4; denominator with repeated factors) $\int \frac{x^4-2x^2+4x+1}{x^3-x^2-x+1}$

Exercise 5. (Ex5; denominator with irreducible quadratic factors) $\int \frac{2x^2-x-4}{x^3+4x}dx$

Problems

1. $\int \frac{x}{x-1}dx$.
2. $\int \frac{x+4}{x^2+2x+5}dx$
3. $\int \frac{x}{x^2-4}dx$

4. $\int \frac{x^3}{x^2-4}dx$
5. $\int \frac{x^2+1}{(x-3)(x-2)^2}dx.$
6. $\int \frac{x^3+x^2+2x+1}{(x^2+1)(x^2+2)}dx.$
7. (Sample B #16) $\int \frac{x+4}{x^3+4x}dx$
8. (Sample A #12) $\int \frac{5x+2}{x^2+x}dx$
9. (Sample C #14) $\int \frac{x+1}{x^2-5x+6}dx$
10. (Sample D #12) $\int \frac{5x+2}{x^2+x}dx$