

## MATH 1710 Tutorial 9

In problems 1–3, evaluate the indefinite integral.

1.  $\int \frac{x}{\sqrt{3-2x-x^2}} dx$
2.  $\int \frac{1}{\sqrt{x^2-6x+13}} dx$
3.  $\int \sqrt{x^2+2x} dx$

In problems 4–6, determine the form for the partial fraction decomposition of the function. Do not find the coefficients.

4.  $\frac{x^3+x^2+1}{(x^2-x)(x^2+x+1)(x^2+1)^3}$
5.  $\frac{x^6+1}{x^6+x^3}$
6.  $\frac{x^3+3x^2-2x+1}{x^6+x^5+6x^4+8x^3+16x-32}$

In problems 7–10, find the partial fraction decomposition of the function.

7.  $\frac{x^2+2x-1}{2x^3+3x^2-2x}$
8.  $\frac{x^4-2x^2+4x+1}{x^3-x^2-x+1}$
9.  $\frac{2x^2-x+4}{x^3+4x}$
10.  $\frac{1-x+2x^2-x^3}{x^5+2x^3+x}$

### Answers

1.  $-\sqrt{3-2x-x^2} - \text{Sin}^{-1}\left(\frac{x+1}{2}\right) + C$
2.  $\ln|\sqrt{x^2-6x+13} + x - 3| + C$
3.  $\frac{1}{2}(x+1)\sqrt{x^2+2x} - \frac{1}{2}\ln|x+1+\sqrt{x^2+2x}| + C$
4.  $\frac{A}{x} + \frac{B}{x-1} + \frac{Cx+D}{x^2+x+1} + \frac{Ex+F}{(x^2+1)} + \frac{Gx+H}{(x^2+1)^2} + \frac{Ix+J}{(x^2+1)^3}$
5.  $1 + \frac{A}{x} + \frac{B}{x^2} + \frac{C}{x^3} + \frac{Ex+F}{x^2-x+1}$
6.  $\frac{A}{x-1} + \frac{B}{x+2} + \frac{Cx+D}{x^2+4} + \frac{Ex+F}{(x^2+4)^2}$
7.  $\frac{1/2}{x} + \frac{1/5}{2x-1} - \frac{1/10}{x+2}$
8.  $x+1 + \frac{1}{x-1} + \frac{2}{(x-1)^2} - \frac{1}{x+1}$
9.  $\frac{1}{x} + \frac{x-1}{x^2+4}$
10.  $\frac{1}{x} - \frac{x+1}{x^2+1} + \frac{x}{(x^2+1)^2}$