

## 2-4 Videos Guide

### 2-4a

- Start with a proper rational function. If the function is an improper rational function, use long division before starting the partial fraction decomposition process
- Cases for partial fraction decomposition (types of factors in the denominator)

- Case I: Linear factor

$$\frac{\text{stuff}}{x+4} \rightarrow \frac{A}{x+4}$$

- Case II: Repeated linear factor

$$\frac{\text{stuff}}{(x+4)^3} \rightarrow \frac{A}{x+4} + \frac{B}{(x+4)^2} + \frac{C}{(x+4)^3}$$

- Case III: Irreducible (prime) quadratic factor

$$\frac{\text{stuff}}{x^2+4} \rightarrow \frac{Ax+B}{x^2+4}$$

- Case IV: Repeated irreducible quadratic factor

$$\frac{\text{stuff}}{(x^2+4)^3} \rightarrow \frac{Ax+B}{x^2+4} + \frac{Cx+D}{(x^2+4)^2} + \frac{Ex+F}{(x^2+4)^3}$$

Exercises:

Evaluate the integral.

### 2-4b

- $\int \frac{3t-2}{t+1} dt$
- $\int_0^1 \frac{x-4}{x^2-5x+6} dx$

### 2-4c

- $\int_2^3 \frac{x(3-5x)}{(3x-1)(x-1)^2} dx$

### 2-4d

- $\int_0^1 \frac{x}{x^2+4x+13} dx$

### 2-4e

- Make a substitution to express the integrand as a rational function and then evaluate the integral.

$$\int \frac{dx}{2\sqrt{x+3} + x}$$