

Calculus

Integration by Partial Fractions

$$(Q1.) (a) \int \frac{x-2}{x^2-4} dx \quad (b) \int \frac{x^2-2}{x^2-4} dx \quad (c) \int \frac{x+2}{x^2+4} dx \quad (d) \int \frac{x^2+2}{x^2+4} dx$$

$$(Q2.) \int \frac{x+4}{x^2+2x+5} dx \quad \text{hint: by completing the square, } x^2+2x+5 = (x+1)^2+4$$

$$(Q3.) \int \frac{2x-1}{(x-1)(x-2)(x-3)} dx$$

$$(Q4.) \int \frac{5x-13}{2x^2+5x-3} dx$$

$$(Q5.) (a) \int \frac{3x^2+6x-54}{x^2+x-20} dx$$

$$(Q6.) \int \frac{2x^2+x-3}{x^3-3x^2} dx \quad \text{vs.} \quad (b) \int \frac{x^2-14x-3}{x^3-3x^2} dx$$

$$(Q7.) \int \frac{3x-5}{(x+1)(x+2)^2} dx$$

$$(Q8.) \int \frac{x^2+7x-3}{(2x+1)(x-2)^2} dx$$

$$(Q9.) \int \frac{1}{x^3+x} dx \quad (a) \text{ by partial fractions} \quad (b) \text{ by u sub}$$

$$(Q10.) \int \frac{8x^2-10x-3}{(x-4)(x^2+1)} dx$$

$$(Q11.) \int \frac{3x^2-3x+8}{x^3-3x^2+4x-12} dx$$

Optional Challenges:

$$\int \frac{1}{x^2(x^4+1)^{\frac{3}{4}}} dx$$