

1. Set up the partial fraction decomposition (but do not solve!)

(a)  $\frac{3}{x^2 - 4}$

(d)  $\frac{2x}{(x^2 - 4)(x^2 + 4)}$

(b)  $\frac{2}{(x^2 - 4)(x^2 - 9)}$

(e)  $\frac{x - 3}{(x^2 - 3x + 2)(x - 2)^2}$

(c)  $\frac{1}{(x^2 - 4)(x - 4)^2}$

(f)  $\frac{5}{x^4(x^2 - 1)^2(x^2 + 1)^3}$

2. Find the partial fraction decomposition (i.e. set them up *and* solve them!)

(a)  $\frac{3}{x^2 - 4}$

(b)  $\frac{x^2 + 4x + 1}{(x - 1)(x + 1)(x + 3)}$

(c)  $\frac{-2x + 4}{(x^2 + 1)(x - 1)^2}$

3. Integrate! (Use the results from above)

(a)  $\int \frac{3}{x^2 - 4} dx$

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

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

4. Integrate!

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

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

(k)  $\int \frac{2}{\sqrt{25 - 4x^2}} dx$

(b)  $\int \sin^3(x) dx$

(g)  $\int \frac{6x + 7}{(x + 2)^2} dx$

(l)  $\int \frac{e^x}{\sqrt{e^{2x} + 9}} dx$

(c)  $\int \frac{3}{\sqrt{9 - x^2}} dx$

(h)  $\int \frac{3x^3}{x^2 - 1} dx$

(m)  $\int \sin^3(x) \cos^2(x) dx$

(d)  $\int \sqrt{1 - x^2} dx$

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

(n)  $\int \cos(2x) \sin^9(2x) dx$

(e)  $\int \cos^2(x) dx$

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

(o)  $\int 3xe^x dx$