University of Strathclyde, Department of Mathematics and Statistics

MM102 Applications of Calculus
Exercises for Week 1

1. Find the partial fraction decomposition without determining the constants.

   (a) $\dfrac{2x+3}{(x-3)(x+5)}$

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

   (c) $\dfrac{x^4+4x^3+2}{(x+2)^3(x-1)^2}$

   (d) $\dfrac{5x^2+1}{(x^2+x+4)(x-2)(x+4)}$

   (e) $\dfrac{3}{(x^2-2x+5)^2(x+3)^3}$

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

2. Evaluate the following integrals.

   (a) $\displaystyle\int \frac{2x+8}{x^2-1}\,\mathrm{d}x$

   (b) $\displaystyle\int \frac{x^4+x^3-x^2+2x+3}{x^2+x-2}\,\mathrm{d}x$

   (c) $\displaystyle\int_0^1 \frac{2x-11}{x^2-x-6}\,\mathrm{d}x$

   (d) $\displaystyle\int \frac{x^2-2x+10}{(x^2+4)(x-3)}\,\mathrm{d}x$

   (e) $\displaystyle\int_2^5 \frac{7x^2-15x+28}{(x^2-4x+13)(x-1)}\,\mathrm{d}x$

   (f) $\displaystyle\int \frac{2x^2-3x}{(x-2)^2(x-1)}\,\mathrm{d}x$

   (g) $\displaystyle\int \frac{3x^2+13x-2}{(x+1)^2(x-3)}\,\mathrm{d}x$

   (h) $\displaystyle\int \frac{3x^2+4x}{(x^2+2x+2)(x-2)}\,\mathrm{d}x$