Math 101 – WORKSHEET 16
PARTIAL FRACTIONS, APPROXIMATE INTEGRATION

1. Partial fractions expansion

(1) Apply Method 2 to find A, B, C such that
$$\frac{6x^2-26x+26}{x^3-6x^2+11x-6} = \frac{6x^2-26x+26}{(x-1)(x-2)(x-3)} = \frac{A}{x-1} + \frac{B}{x-2} + \frac{C}{x-3}$$

(2) Now consider $\frac{8x-10}{4x^3-4x^2+5x} = \frac{8x-10}{x(4x^2-4x+5)} = \frac{A}{x} + \frac{Bx+C}{4x^2-4x+5}$
   (a) Find A using method 2

   (b) Calculate $\frac{8x-10}{x(4x^2-4x+5)} - \frac{A}{x}$ to find B, C.

(3) Finally consider $\frac{x^2}{(x+2)(2x-3)}$. Can we have A, B such that $x^2 = A(x+2) + B(2x-3)$?

2. Approximate integration

Let $f(x) = \sin(x^2)$. Estimate $\int_0^1 f(x)\,dx$ using the trapezoid rule, the midpoint rule, and Simpson's rule, with $n = 4$ in all cases. You may leave your answers in calculator-ready form.