

M242 Q5(a) (S. Zhang) (8 points). Name: _____

1. Find

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

• **ans:** Partial fractions:

$$\frac{A}{x-2} + \frac{B}{x-1} + \frac{C}{(x-1)^2}$$

$$2x^2 - x - 4 = A(x-1)^2 + B(x-2)(x-1) + Cx - 2$$

$$x = 2, 2(4) - 2 - 4 = A, A = 2$$

$$x = 1, 2(1) - 1 - 4 = C(-1), C = 3$$

$$x = 0, -4 = A + 2B - 2C, 2B = A - 2C + 4 = 0$$

$$\begin{aligned} \int \frac{2x^2 - x - 4}{(x-2)(x-1)^2} dx &= \int \frac{2}{x-2} dx + \int \frac{3}{(x-1)^2} dx \\ &= 2 \ln|x-2| - 3(x-1)^{-1} + C \end{aligned}$$