

# Calculus I

## $\int (ax + b)^p dx$ , part 4

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## Example

Find  $\int_1^2 \frac{dx}{(2-3x)^2}$ .

- Let  $u = 2 - 3x$ .
- Then  $du = -3 dx$ .
- Therefore  $dx = -\frac{1}{3}du$ .
- When  $x = 1$ ,  $u = -1$ .
- When  $x = 2$ ,  $u = -4$ .

$$\begin{aligned} \int_{x=1}^{x=2} \frac{dx}{(2-3x)^2} &= -\frac{1}{3} \int_{u=-1}^{u=-4} \frac{du}{u^2} = -\frac{1}{3} \int_{-1}^{-4} u^{-2} du \\ &= -\frac{1}{3} \cdot \left[ -\frac{1}{u} \right]_{-1}^{-4} = \frac{1}{3} \left[ \frac{1}{u} \right]_{-1}^{-4} \\ &= \frac{1}{3} \left( \frac{1}{-4} - \frac{1}{-1} \right) = \frac{1}{3} \left( 1 - \frac{1}{4} \right) = \frac{1}{4}. \end{aligned}$$