

Exercise 5

Find the general solution for each of the following first order ODEs:

$$xu' + u = 2x, \quad x > 0$$

Solution

Observe that the left side can be written as $(xu)'$ by the product rule.

$$\frac{d}{dx}(xu) = 2x$$

Now integrate both sides with respect to x .

$$xu = x^2 + C$$

Therefore,

$$u(x) = x + \frac{C}{x}, \quad x > 0.$$