Exercise 3

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

$$(x^2 + 9)u' + 2xu = 0, \ x > 0$$

Solution

Observe that the left side can be written as $[(x^2 + 9)u]'$ by the product rule.

$$\frac{d}{dx}[(x^2 + 9)u] = 0$$

Now integrate both sides with respect to x.

$$(x^2 + 9)u = C$$

Therefore,

$$u(x) = \frac{C}{x^2 + 9}, \ x > 0.$$