

(2)

2.2 Separable Equations

Ex 2.2: 1, 2, 3, 5, 7, 8, 9, 11, 13, 15, 17, 19, 23, 25, 29

A 1st order separable DE has the form

$$(*) \quad \frac{dy}{dx} = f(x) g(y)$$

To solve (*) we write

$$\frac{dy}{g(y)} = f(x) dx$$

The ~~total~~ general solution is given implicitly by

$$\int \frac{dy}{g(y)} = \int f(x) dx$$

Example (#6) Determine whether the DE

$$(xy^2 + 3y^2) \frac{dy}{dx} - 2x = 0$$

is separable.

Note: This DE means

$$(xy^2 + 3y^2) \frac{dy}{dx} - 2x = 0.$$

$$y^2(x+3) \frac{dy}{dx} = 2x$$

$$\frac{dy}{dx} = \frac{2x}{y^2(x+3)} = \left(\frac{2x}{(x+3)} \right) \left(\frac{1}{y^2} \right)$$

and the DE is separable.