

1. True or False?

The following ODE is separable.

$$y' = 2x \ln(x^y) + y^2$$

1. True or False?

The following ODE is separable.

$$y' = 2x \ln(x^y) + y^2$$

**Follow-up.** Solve it! (Hint: integration by parts.)

2. True or False?

The following ODE is separable.

$$y' = xy + x + y + 1$$

2. True or False?

The following ODE is separable.

$$y' = xy + x + y + 1$$

**Follow-up.** Solve it!

3. Consider the ODE  $(x^2 - 1)y' = yx - y$ .

This ODE is...

- (A) Separable but not linear.
- (B) Linear but not separable.
- (C) Both linear and separable.
- (D) Neither linear nor separable.

3. Consider the ODE  $(x^2 - 1)y' = yx - y$ .

This ODE is...

- (A) Separable but not linear.
- (B) Linear but not separable.
- (C) Both linear and separable.
- (D) Neither linear nor separable.

**Follow-up.** Solve it!

A simple version of *Newton's law of cooling* says that, if an object of temperature  $T$  is placed in an environment of constant ambient temperature  $A$ , then  $dT/dt$  is proportional to  $A - T$ .

4. True or False?

$$\lim_{t \rightarrow \infty} T = A.$$

5. True or False?

Suppose  $p$  is some function of  $x$  and consider the ODE

$$y' + p(x)y = 0.$$

If  $f$  is a solution to this ODE, then so is  $cf$  for any constant  $c$ .



5. True or False?

Suppose  $p$  is some function of  $x$  and consider the ODE

$$y' + p(x)y = 0.$$

If  $f$  is a solution to this ODE, then so is  $cf$  for any constant  $c$ .

**Follow-up.** Do all solutions to this ODE form a vector space?