

Question 1

Determine the validity of the statements:

S : All solutions of the differential equation $y' = -1 - y^4$ are decreasing functions.

T : All solutions of the differential equation $y' = x + y$ are decreasing functions.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 2

Determine the validity of the statements:

S : All solutions of the differential equation $y' = x + y$ are increasing functions.

T : All solutions of the differential equation $y' = -y^3$ are decreasing functions.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 3

Determine the validity of the statements:

S : All solutions of the differential equation $y' = 2 + y^2$ are decreasing functions.

T : All solutions of the differential equation $y' = -2 - y^2$ are decreasing functions.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 4

Determine the validity of the statements:

S : Some solutions of the differential equation $y' = -y^3$ are decreasing functions.

T : All solutions of the differential equation $y' = 1 + x^2 + y^2$ are increasing functions.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 5

Determine the validity of the statements:

S : All solutions of the differential equation $y' = 1 + x^2 + y^2$ are increasing functions.

T : All solutions of the differential equation $y' = -1 - y^4$ are increasing functions.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 6

Determine the validity of the statements:

S : The equation $y' = x + y$ is separable.

T : The equation $y' = 6xy - 6$ is separable.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 7

Determine the validity of the statements:

S : The equation $e^x y' = y$ is separable.

T : The equation $y' = e^{x+y}$ is separable.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 8

Determine the validity of the statements:

S : The equation $y' = e^x + y$ is separable.

T : The equation $(1 + \cos x)y' = (1 + e^{-y}) \sin x$ is separable.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 9

Determine the validity of the statements:

S : The equation $y' = 3y - 2x + 6xy - 1$ is separable.

T : The equation $y' = \sin(x + y)$ is separable.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 10

Determine the validity of the statements:

S : The equation $y' = \frac{x^2}{y^2}$ is separable.

T : The equation $y' = x^2y$ is separable.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 11

Determine the validity of the statements:

S : The differential equation $y \cos x = x^2 y' - x$ is linear.

T : The differential equation $yy' + xy = 1$ is linear.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 12

Determine the validity of the statements:

S : The differential equation $y' + xy = e^y$ is linear.

T : The differential equation $xy' + y = 2x$ is linear.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 13

Determine the validity of the statements:

S : The differential equation $e^x y' = y$ is linear.

T : The differential equation $y' + xy^2 = \sqrt{x}$ is linear.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 14

Determine the validity of the statements:

S : The differential equation $y' = \frac{1}{x} + \frac{1}{y}$ is linear.

T : The differential equation $y' + xy = e^x$ is linear.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 15

Determine the validity of the statements:

S : The differential equation $y' + xy = \sqrt{x}$ is linear.

T : The differential equation $y' + xy = \sqrt{y}$ is linear.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 16

Determine the validity of the statements:

S : The equation $y' = x + xy$ is not separable.

T : The differential equation $y' + 2xy = 1$ is linear.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 17

Determine the validity of the statements:

S : The equation $y' = \frac{x^2}{y^2}$ is not separable.

T : The differential equation $x^2y' + xy = 1$ is linear.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 18

Determine the validity of the statements:

S : The differential equation $x - y' = xy$ is linear.

T : The equation $x - y' = xy$ is separable.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 19

Determine the validity of the statements:

S : The equation $y' = \frac{6x^2}{2y + \cos y}$ is separable.

T : The differential equation $y \sin x = x^2 y' - x$ is linear.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 20

Which of the following is a homogeneous differential equation?

A. $(4x + 6y + 5)dy - (3y + 2x + 4)dx = 0$

B. $xydx - (x^3 + y^2)dy = 0$

C. $(x^3 + 2y^2)dx + 2xydy = 0$

D. $y^2dx + (x^2 - xy - y^2)dy = 0$

Question 21

The number of arbitrary constants in the general solution of differential equation of the second order is:

- A. 0
- B. 1
- C. 2
- D. 3

Question 22

The number of arbitrary constants in the particular solution of differential equation of the first order is:

- A. 0
- B. 1
- C. 2
- D. 3

Question 23

$$y' = \frac{4x}{y}, \quad y(0) = 1$$

The particular solution is

- A. $y = \sqrt{4x^2 - 4}$
- B. $y = 2x^2 + 1$
- C. $y = e^{2x^2}$
- D. $y = \sqrt{4x^2 + 1}$

Question 24

The general solution of $y'' - 2y' + y = 0$ is

- A. $y = (ax + b)e^x$
- B. $y = (ax + b)e^{-x}$
- C. $y = ae^x + be^{-x}$
- D. $y = a \cos x + b \sin x$

Question 25

The general solution of $y'' + 2y' + y = 0$ is

- A. $y = (ax + b)e^x$
- B. $y = (ax + b)e^{-x}$
- C. $y = ae^x + be^{-x}$
- D. $y = a \cos x + b \sin x$

Question 26

The general solution of $y'' + y = 0$ is

- A. $y = (ax + b)e^x$
- B. $y = (ax + b)e^{-x}$
- C. $y = ae^x + be^{-x}$
- D. $y = a \cos x + b \sin x$

Question 27

The general solution of $y'' - y = 0$ is

- A. $y = (ax + b)e^x$
- B. $y = (ax + b)e^{-x}$
- C. $y = ae^x + be^{-x}$
- D. $y = a \cos x + b \sin x$

Question 28

Determine the validity of the statements:

S : If y_1 and y_2 are solutions of $y'' + y = 0$, then $y_1 + y_2$ is also a solution of the equation.

T : If y_1 and y_2 are solutions of $y'' + y = 0$, then $y_1 \cdot y_2$ is also a solution of the equation.

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 29

Determine the validity of the statements:

S : The equation $y'' - y = e^x$ has a particular solution of the form $y_p = Ae^x$

T : The equation $y'' - y = e^x$ has a particular solution of the form $y_p = Axe^x$

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.

Question 30

Determine the validity of the statements:

S : The equation $y'' - y = e^{2x}$ has a particular solution of the form $y_p = Ae^{2x}$

T : The equation $y'' - y = e^{2x}$ has a particular solution of the form $y_p = Axe^{2x}$

- A. S and T are true.
- B. only S is true.
- C. only T is true.
- D. S and T are false.