Worksheet: Basics of Differential Equations

Q1: Which of the following relationships is an ordinary differential equation?

A $z = 5xy$

B $\frac{\partial^2 z}{\partial x^2} - z = 0$

C $\frac{\mathrm{d}y}{\mathrm{d}x} + y = 0$

D $y = \sqrt{x^2 - 4}$

Q2: Which of the following relationships is an ordinary differential equation?

A $\frac{\mathrm{d}y}{\mathrm{d}x} + y = 0$

B $z = 5xy$

C $y = \sqrt{x^2 - 4}$

D $\frac{\partial^2 z}{\partial x^2} - z = 0$

Q3: Is the differential equation $\frac{\mathrm{d}y}{\mathrm{d}x} + x\sqrt{y} = x^2$ linear?

A no

B yes

Q4: Determine the order of the following differential equation:

$$\left(\frac{\mathrm{d}^2y}{\mathrm{d}x^2}\right)^3 - (y''')^4 + x = 0.$$

A 4

B 3

C 2

D 1

Q5: Is the function $y = 5-3x+3x\ln x$ a solution to the differential equation $y' = 3\ln x$?

A Yes

B No

Q6: Is the function $y = 3e^x - x + 1$ a solution to the differential equation $y' = x + y$?

A No

B Yes

Q7: Is the function $y = \dfrac{1}{2+x}$ a solution to the differential equation $y' = -y^2$?

A Yes

B No

Q8: Is the function $y = e^{5x} - e^x$ a solution to the differential equation $y' = 5y - 4e^x$?

A Yes

B No

Q9: Is the function $y = 2 + \ln 2x$ a solution to the differential equation $xy' = 2$?

A No

B Yes

Q10: Is the function $y = \dfrac{x^4}{4}$ a solution to the differential equation $y' = x^3$?

A Yes

B No