Assignment 4

1) $[\frac{d^3y}{dx^3}]^2 + \sin(x)\frac{d^2y}{dx^2} + yx^2 = e^{-x}$ **1 point**

The order and degree of the equation above are, respectively,

- 2 and 3
- 3 and 2
- 3 and 3
- None of the above

Accepted Answers:
3 and 2

2) $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} = 0$ **1 point**

The number of unknown constants in the general solution of the DE above is

- 0
- 1
- 2
- 3

Accepted Answers:
3

3) $y'' + 2xy' = 3\sin(xy)$ **1 point**

The equation above is an example of a

- Homogenoeous linear equation
- nonhomogeneous linear equation
- nonlinear equation
- None of the above

Accepted Answers:
nonlinear equation

4) **1 point**

$y' = -\frac{4xy+x}{2x^2+y}$

The above equation can be solved by

- Separation of variables
- Exact differentials
- an integrating factor that is a nonconstant function of *x*
- None of the above

Accepted Answers:
Exact differentials

5) The integrating factor that converts the following differential equation $(3x + x\sin y)y' + 4y - 2 = 0$ to an exact differential is **1 point**

- $\sin y$
- $\sin x$
- $\sin y + y$
- None of the above

Accepted Answers:
None of the above

6) The general solution of the system of ODEs given below **1 point**

$\frac{dx}{dt} = 4x - 5y$

$\frac{dy}{dt} = -x + y$

is of the form (a_0 and a_1 are constants)

- $a_0\begin{bmatrix}1\\-1\end{bmatrix}e^{4t} + a_1\begin{bmatrix}2\\-3\end{bmatrix}e^{-2t}$
- $a_0\begin{bmatrix}1\\1\end{bmatrix}e^{6t} + a_1\begin{bmatrix}2\\5\end{bmatrix}e^{-t}$
- $a_0\begin{bmatrix}1\\-1\end{bmatrix}e^{-6t} + a_1\begin{bmatrix}2\\-5\end{bmatrix}e^{t}$
- None of the above

Accepted Answers:
None of the above

7) The particular solution of the ODE **1 point**

$2xy' + 3y^2 = 0$

with boundary condition *y(1) = 2* is

- $\frac{3}{2}\ln x + \frac{1}{2}$
- $\frac{2}{3\ln x+1}$
- $+$

None of the above

Accepted Answers:

$\frac{2}{3\ln x+1}$

8) The concentration reactants A and B in a reaction follow the following evolution with time ***1 point***

$$\frac{d[A]}{dt} = -2[A] + 3[B]$$
$$\frac{d[B]}{dt} = [A] - [B]$$

Given that the initial conditions correspond to *[A] = 1, [B] = 1* units, the concentration of A after 1 unit of time is closest to

- 0.5
- 1.2
- 0.1
- 2.3

Accepted Answers:

1.2

9) For a particular reaction, the concentration of the reactant A varies with time as ***1 point***

$$\frac{d[A]}{dt} = -2[A]^2 t$$

Given that at t=0, we have [A]=2, the concentration of [A] after 5 units of time is exactly equal to

- 2/51
- 5
- 1/17
- None of the above

Accepted Answers:

2/51

10) The implicit solution of the ODE ***1 point***

$$y' = \frac{3\tan x+\sin y}{x^2+\cos y}$$

with the condition y(0) = 0 is given by

- $y^3 - \ln\sin x - 3\sin y = 0$
- $y^2 - 4\sin x - 3x\sin y = 0$
- $y^3 - 9\ln\cos x - 3x\sin y = 0$
- None of the above

Accepted Answers:

None of the above