This print-out should have 8 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 (part 1 of 3) 10.0 points

For the differential equation

$$\frac{dy}{dx} + 2y = 8e^{3x},$$

(i) first find its general solution.

1. $y = \frac{8}{5}e^{-3x} + Ce^{-2x}$

2. $y = \frac{1}{5}e^{3x} + Ce^{-2x}$

3. $y = \frac{8}{5}e^{-3x} + Ce^{2x}$

4. $y = \frac{8}{5}e^{3x} + Ce^{2x}$

5. $y = \frac{8}{5}e^{3x} + C\,e^{-2x}$

002 (part 2 of 3) 10.0 points

(ii) Then find the particular solution y_0 such that $y_0(0) = 8$.

1. $y_0 = \frac{8}{5}e^{3x} + \frac{32}{5}e^{-2x}$

2. $y_0 = \frac{8}{5}e^{-3x} + \frac{32}{5}e^{2x}$

3. $y_0 = -\frac{8}{5}e^{3x} + \frac{32}{5}e^{-2x}$

4. $y_0 = \frac{8}{5}e^{3x} - \frac{32}{5}e^{-2x}$

5. $y_0 = \frac{1}{5}e^{3x} + \frac{32}{5}e^{-2x}$

003 (part 3 of 3) 10.0 points

(iii) For the particular solution y_0 in (ii), determine the value of $y_0(1)$.

1. $\frac{8}{5}e^{3} - \frac{32}{5}e^{-2}$

2. $\frac{1}{5}e^{3} - \frac{32}{5}e^{-2}$

3. $\frac{8}{5}e^{-3} + \frac{32}{5}e^{2}$

4. $\frac{8}{5}e^{3} + \frac{32}{5}e^{-2}$

5. $\frac{1}{5}e^{3} + \frac{32}{5}e^{-2}$

004 10.0 points

If y_0 is the solution of the equations

$$xy' + 2y = 4x, \quad y(1) = 6,$$

determine the value of $y_0(2)$.

1. $y_0(2) = \frac{11}{3}$

2. $y_0(2) = \frac{43}{12}$

3. $y_0(2) = \frac{7}{2}$

4. $y_0(2) = \frac{15}{4}$

5. $y_0(2) = \frac{23}{6}$

005 10.0 points

If y_1 is the particular solution of the differential equation

$$\frac{dy}{dx} - \frac{2y}{x} = 6x^2 - 6$$

which satisfies $y(1) = 6$, determine the value of $y_1(2)$.

1. $y_1(2) = 35$

2. $y_1(2) = 34$

3. $y_1(2) = 32$

4. $y_1(2) = 33$

5. $y_1(2) = 36$

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006 10.0 points

Solve the differential equation $y' + 2y = 2e^x$.

1. $y = \frac{2}{3}e^{-x} + Ce^{-2x}$

2. $y = \frac{2}{3}e^{x} + Ce^{-2x}$

3. $y = -\frac{2}{3}e^{x} + Ce^{2x}$

4. $y = -\frac{2}{3}e^{x} + Ce^{-2x}$

5. $y = \frac{2}{3}e^{x} + Ce^{2x}$

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007 10.0 points

Solve the differential equation

$$(5+t)\frac{du}{dt} + u = 5 + t, \quad t > 0\,.$$

1. $u = \frac{t^2 + 5t}{2(t+5)} + C$

2. $u = \frac{t^2 + 10t + 2C}{2(t+5)}$

3. $u = \frac{t^2 + 5t + 2C}{2(t+5)}$

4. $u = \frac{t^2 + 5t + C}{t+5}$

5. $u = \frac{t^2 + 5t}{t+5} + C$

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008 10.0 points

Solve the initial-value problem

$$t\frac{dy}{dt} + 2y = t^5, \quad t > 0, y\,(1) = 0\,.$$

1. $y = \frac{t^6}{7} - \frac{1}{7t^2}$

2. $y = \frac{t^5}{7} - \frac{1}{7t^2}$

3. $y = \frac{t^5}{7} - \frac{1}{7t^3}$

4. $y = \frac{t^5}{7} + \frac{1}{7t^2}$

5. $y = \frac{t^5}{7} - \frac{1}{7t^4}$