Academic Year:	2017−2018	**Course Name:**	ODEs
Semester:	Second Semester	**Course Number:**	250203
Exam:	1	**Instructor Name:**	Feras Awad
Exam Date:	29/03/2018	**Student Name:**	_____
Exam Day:	Thursday	**University ID:**	_____
Mark:	[20+2]	**Section:**	[1]

Question ONE : (8 points) Write the symbol of the correct answer in the blank.

1. $\left[\right]$ The differential equation $y'' + 2y' + 3x = \sin y$ is

   (A) 1st order, linear   (B) 1st order, nonlinear

   (C) 2nd order, linear   (D) 2nd order, nonlinear

2. $\left[\right]$ The set of values of m, for which $y = e^{mx}$ is solution to $y'' - 5y' + 6y = 0$, is

   (A) $\{2,3\}$ (B) $\{-2,-3\}$ (C) $\{1,5\}$ (D) $\{3,4\}$

3. $\left[\right]$ The solution of the initial value problem $y' = xy$; $y(0) = 3$ is

   (A) $y = 2e^{x^2/3}$ (B) $y = 3 + e^x$ (C) $y = 3e^{x^2/2}$ (D) $y = 3e^{x^2}$

4. $\left[\right]$ The differential equation $(x^2 + y^2)\, y' = xy$ is

   (A) Bernoulli   (B) Exact

   (C) Homogeneous   (D) Separable

Question TWO : (2 points)

Consider the initial value problem $y' = x - 2y$; $y(0) = \dfrac{1}{2}$.
Determine which of the two curves shown in the figure is the possible solution curve. Explain your reasoning.
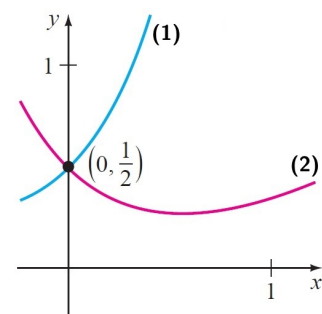
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Question THREE :

Consider the differential equation $(2x^2 + y)\,dx + (x^2y - x)\,dy = 0$.

(a) **(1 point)** Show that the equation is **NOT** exact.

(b) **(2 points)** Find a special integrating factor that transforms the differential equation to exact equation.

(c) **(4 points)** Multiply the differential equation by the integrating factor from (b), then solve the resulting exact equation.

Question FOUR : (5 points) Solve

$$\frac{dy}{dx} - 5y = -\frac{5}{2}xy^3.$$ $(\star)$