Brief Article

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= =2.5cm=usual =0 October 29, 1997 **Math 108, Exam 2**

This exam is worth a total of 100 points. There
and 3 partial credit. Each multiple choice prob
are assigned next to the partial credit problems
credit section of the test inside the test bookle
multiple choice section by putting a $\boxed{\times}$ in the
9:20am to complete the exam. Good luck!

Sign your name

6=2.5in =0.8cm =1cm =0.4cm=1 Find the constant solutions of the differential equation $y' = y^3 + 5y^2 - 24y$.

$y = 0,\ \ y = 3,\ \ y = -8$ $y = 0,\ \ y = -6,\ \ y = 4$ $y = 0,\ \ y = 2,\ \ y = -12$ $y = 3,\ \ y = -8$ $y = -6,\ \ y = 4$

Determine the relationship of the two lines:

$$x - 3y = 6, 2x + y = -1.$$

Cannot be determined. The lines are parallel. They are the same line. There are infinitely many solutions. There is a unique solution.

The function $y = t^2+3t+7$ is a solution to which of the following differential equations?

$y' - y = -t^2 - 4$ $(y')^2 - 4y = -19$ $(y')^2 - y = 2$ $y' - y = t^2 + 6$ $y' = y^2 + 14$

If $\vec{x} = (1, 3, -2, 0)$ and $\vec{y} = (-1, 2, 4, -6)$ are two vectors in $\Re^4$, determine $(2\vec{x}) \cdot (-3\vec{y})$.

$(6, -36, 48, 0)$ 18 54 $(5, 0, -16, 9)$ -42

An experimenter reports that a certain strain of bacteria grows at a rate proportional to the square of the size of the population. Set up a differential equation which describes the growth of the population and has a solution $y = f(t)$ where $f(t)$ is the size of the population at any time t.

$(y')^2 = k$ $y' = k^2y$ $y' = ky$ $y' = ky^2$ $y' = kt^2$

Determine the solution of the differential equation $y' = 6t - 5t^2$.

$6 - 10t$ $6t^2 - 5t^3 + C$ $3t^2 - 5t^3 + C$ $3t^2 - \frac{5}{3}t^3 + C$ None of the above

What is the length of the vector $\vec{x} = (-2, 4, 2, 5)$?

7 49 $\sqrt{41}$ 9 41

Given the differential equation $y' = (y-2)(y+3)$, determine which of the following is true for the constant solutions $y = 2$ and $y = -3$.

$y = -3$ is unstable and $y = 2$ is stable. $y = 2$ is stable and $y = -3$ is stable. $y = 2$ is unstable and $y = -3$ is stable. $y = -3$ is unstable and $y = 2$ is unstable. None of the above.

Solve the following separable differential equation with the given initial value. Recall that $e^{xy} = (e^y)^x$ and that $e^{(\ldots)+C} = Ae^{(\ldots)}$.

(12 points)

$$y' = \frac{y^2 + 6}{yt}, \qquad y(1) = 3$$

amount of money in the account at any time t.

b) Sketch some solutions of this differential equation.

c) Given that the person initially deposits \$3000, solve the differential equation to determine $M(t)$ - the amount of money in the account at any time t.

(20 points)

A certain individual decides to open an Individual Retirement Account (IRA). This person makes continuous deposits of \$2000 each year. The interest rate is 5%.

a) Find the differential equation whose solution is given by the function $M(t)$ where $M(t)$ is the

Evaluate the following system of linear equations using Gaussian elimination. Your answer should be of the form $x_i =?$. (12 points)

$$x_1 - 3x_2 + \quad x_3 - 2x_4 = 13x_1 - 6x_2 + 12x_3 - 6x_4 = 34x_1 - 9x_2 + 13x_3 - 8x_4 = 4 - 2x_1 + 7x_2 + \quad x_3 + 4x_4 = -2$$