A (mostly) Differential Equations Crossword Puzzle

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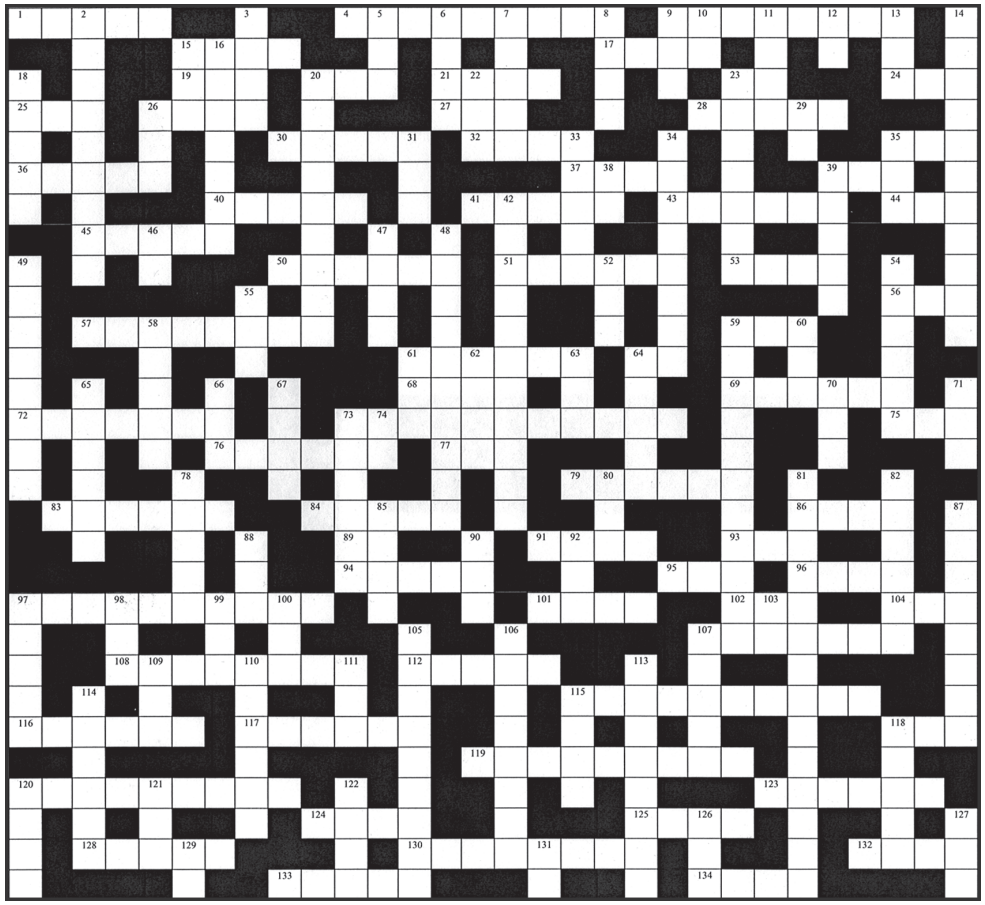

ACROSS

1 driving function
4 determinant used to test linear independence
9 these can be used to represent homogeneous systems
15 Heaviside ____ size
17 ____ step function U ($t-a$)
19 Internal Revenue Service (abbr.)
20 to find a sum
21 the best subject to study
23 non-applicable (abbr.)
24 ____-linear
25 to free or eliminate
26 such as the abscissa or ordinate
27 to guess (abbr.)
28 $\int_0^\infty e^{-t}t^{x-1}dt$ defines this function
30 if $\partial M/\partial y = \partial N/\partial x$ then $M(x,y)dx + N(x,y)dy$ is an ____ DE
32 ____-life is the measure of the stability of a radioactive substance
35 "____-humbug!"
36 his method can be used to approximate a solution to $y' = f(x,y)$, $y(x_0) = y_0$
37 England's ____ of Wight, birthplace of Hooke
39 the kind you eat, not 3.14…
40 used to solve IVPs and spring/mass systems (second word; see 39 down)
41 one of three equal parts
43 in the exponential function, e^{kt}, when $k > 0$ we say k is this type of constant
44 a PDE that is not continuous is ____-defined
45 mathematical description of a system or someone frequently photographed
50 this bridge collapsed due to its nonlinear springs (first word; see 23 down)
51 movement, such as free undamped
53 when a student first gets to DE class, she ____ down at her desk
56 goodbye
57 in an Intro to DE course, most equations studied are ____
59 "You ____ do it!"
61 an ODE with the dependent variable and all its derivatives of the first degree and each coefficient depends at most on the independent variable
64 civil engineering (abbr.)
68 image, such as on a computer screen
69 his Law of Cooling/Warming
72 the integral $\int_0^\infty e^{-st}f(t)dt$ is this transform of f
73 ____ Institute at Utrecht University, named after this 20th century topologist
75 exam taken prior to entrance into grad school (abbr.)
76 translator also known as Prophatius
77 an abbreviated version of Fibonacci's first name
79 direction fields are made of this type of elements that represent various slopes
83 exactly one solution curve passing through the point (x_0,y_0)
84 this function is defined as $\frac{2}{\sqrt{\pi}}\int_0^x e^{-t^2}\,dt$
86 basic trig function
89 Ode ____ Joy
91 the half- ____ of radium is about 1700 years
93 plaything
94 his law states the restoring force of a spring is proportional to its elongation
95 indicates three
96 spring/____ system
97 ____ long-wave equation, a system of PDEs
101 interval that does not include its endpoints
102 other extreme (abbr.)
104 to consume
107 the I of IVP
108 the solution to this equation is $P(t) = \frac{aP_0}{bP_0 + (a - bP_0)e^{-at}}$
112 having the same quantity, measure, or value
115 the fourth order of this method to finding solutions to IVPs is most popular and accurate (two words)

116 his rule solves systems of linear equations using determinants, not the Seinfeld character
117 this theory is based on the action of cosmic radiation on nitrogen (first word; see 54 down)
118 space a solid occupies (abbr.)
119 $dy/dx = g(x)h(y)$ is said to have these kinds of variables
120 a set of functions are linearly ____ if the Wronskian is 0
123 solution that contains an arbitrary constant represents a set of solutions
124 Gallup ____
125 lax ____, two linear operators used to solve a PDE
128 Greek symbol for change
130 use $(k+1)P_{k+1}(x) - (2k+1)xP_k(x) + kP_{k-1}(s) = 0$ to find the $(k+1)^{st}$ ____ Polynomial
132 a deflection of a ____ is governed by a linear fourth-order DE
133 the unit step function is a little on the ____-side
134 his equation is used in the study of diffraction of light and radio waves and aerodynamics

DOWN

2 objects that swing back and forth
3 if $a < b$ then a is ____ than b
5 use Newton's method to study a rotating bead on a ____
6 to label or term
7 method of numerically integrating ODEs using a trial step at the midpoint of an interval is the Runge-____ Method
8 if a lineal element at a point on the curve has zero slope, the curve is called ____-cline
9 smallest value of a set or function (abbr.)
10 Casey ____ the Bat
11 wander
12 Computer Science (abbr.)
13 $1/csc =$ ____
14 if $L(f(x)) = 0$, L is said to be an ____
15 a perfect number
16 solution of a DE that is identically zero
18 highest derivative in an equation
20 when solving Cauchy-Euler equations, we look at the roots of this equation
22 burnt textbook
23 second word of 50 across
26 use DE to determine velocity of a falling body if ____ resistance is proportional to velocity squared
29 ____ and pa
31 a rectangle is ____-dimensional
33 deflection curve corresponding to smallest critical load is known as the ____ buckling mode
34 DE used in advanced studies in applied math, physics, and engineering is named after this French mathematician
35 imaginary part of the zeroth order Bessel function of the first kind, defined by Kelvin
38 standard deviation (abbr.)
39 first word of 40 across
42 the DE $a_1(x)y' + a_0(x)y = g(x)$ when $g(x) = 0$
46 title, after receiving your PhD (abbr.)
47 contemporary author of articles on DE, not collectible bears
48 solution of a DE that is free of arbitrary parameters
49 19th century Belgian mathematician-biologist who studied model predicting human population
52 Initial Value Problem (abbr.)
54 second word of 117 across
55 Mathematical Association of America (abbr.)
58 in the exponential function, e^{kt}, when $k < 0$ we say k is this type of constant
59 the Laplace transform of the ____ of f and g is the product of the Laplace transforms of f and g
60 not old
61 in group theory, a differential manifold that obeys group properties and satisfies the additional condition that the group operations are differentiable
62 point at which a continuous curve crosses itself
63 rodent
64 use Newton's second law to study a ____ pulled at a constant force
65 ____/mass system
66 collection of objects in which order has no significance
67 a figure-eight has two of these
70 $sin/cos =$ ____
71 Research Experience for Undergraduates (abbr.)
73 $y^{(4)} = y\sin(x) - e^x$ is ____-order
74 letters used to denote Euclidean n-space
78 if $\Gamma(x)$ is the Gamma function, then $-\Gamma'(1)$ equals ____'s constant
80 if and only if (abbr.)
81 if $\lim_{x\to\infty} y(x) = c$ the critical point c is ____ stable
82 his equation is the DE $x^2y'' + xy' + (x^2 - y^2)y = 0$
85 there may be distinct, repeated real, or complex conjugate ____s of a characteristic equation
87 real number c is a ____ point of the autonomous DE if $f(c) = 0$
88 Greek symbol for the golden ratio, or a PDE named the ____-four equation
90 $1/cos =$ ____
92 problem with initial conditions (abbr.)
97 unit impulse $\delta(t - t_0)$ called the ____ delta function
98 buddy
99 to travel or glide, as in a sport
100 animal doctor
103 ratio of a circle's circumference to its diameter
105 DE of form $y' + P(x)y = f(x)y^n$ is his equation
106 DE of form $ty'' + (1-t)y' + ny = 0$ is his equation
107 perfect
109 ordinary differential equation (abbr.)
110 after first
110 corn on the ____
113 free ____ motion is also called simple harmonic motion
114 spring/mass system can be over-, critically, or under- ____
115 field of rational and irrational numbers is called the ____ numbers
118 the numbers 6 and –1 are eigen-____ for the matrix $\begin{pmatrix} 1 & 2 \\ 5 & 4 \end{pmatrix}$
120 example shown by a professor
121 matrix A is ____-potent if $A^m = 0$, for some integer m
122 Euclid might have worn one of these
126 Rudolf Lipschitz's wife
127 American Mathematical Society (abbr.)
129 back-____-back
131 not yes

See solution at the Math Horizons *website.*