Mary Pugh **138695_MAT267H1_S_LEC0101**
Assignment Webwork_1 due 01/15/2020 at 11:59pm EST

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1. (1 point) `Library/Rochester/setDiffEQ1/osu_de_1_3.pg`
Match the following differential equations with their solutions. The symbols A, B, C in the solutions stand for arbitrary constants.
You must get all of the answers correct to receive credit.

___1. $\dfrac{d^2y}{dx^2} + 49y = 0$
___2. $\dfrac{dy}{dx} = \dfrac{-2xy}{x^2 - 7y^2}$
___3. $\dfrac{d^2y}{dx^2} + 10\dfrac{dy}{dx} + 25y = 0$
___4. $\dfrac{dy}{dx} = 14xy$
___5. $\dfrac{dy}{dx} + 15x^2y = 15x^2$

A. $y = Ce^{-5x^3} + 1$
B. $y = Ae^{7x^2}$
C. $3yx^2 - 7y^3 = C$
D. $y = Ae^{-5x} + Bxe^{-5x}$
E. $y = A\cos(7x) + B\sin(7x)$

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2. (1 point) `Library/MiamiUOhio/DiffEq/Definitions_and_Terminology/Problem18.pg`
Let $y''' - 11y'' + 28y' = 0$.

Find all values of r such that $y = e^{rx}$ satisfies the differential equation. If there is more than one correct answer, enter your answers as a comma separated list.

$r =$ ________ help (numbers)

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3. (1 point) `Library/MiamiUOhio/DiffEq/Definitions_and_Terminology/Problem19.pg`
Let $t^2y'' + 17ty' + 63y = 0$.

Find all values of r such that $y = t^r$ satisfies the differential equation for $t > 0$. If there is more than one correct answer, enter your answers as a comma separated list.

$r =$ ________ help (numbers)

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4. (1 point) `Library/maCalcDB/setDiffEQ3Separable/ur_de_3_1.pg`
A. Solve the following initial value problem:

$$(t^2 - 16t + 28)\frac{dy}{dt} = y$$

with $y(8) = 1$. (Find y as a function of t.)
$y =$ ________________.

B. On what interval is the solution valid?

Answer: It is valid for ___ $< t <$ ___.

C. Find the limit of the solution as t approaches the left end of the interval.
(Your answer should be a number or the word "infinite".)
Answer: ___________.

D. Similar to C, but for the right end.
Answer: ___________.

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5. (1 point) `Library/Wiley/setAnton_Section_8.4/Anton_8_4_Q9.pg`
Solve the initial value problem.

$$\frac{dy}{dx} - 2xy = 8x, \; y(0) = -2$$

$y =$ ________________

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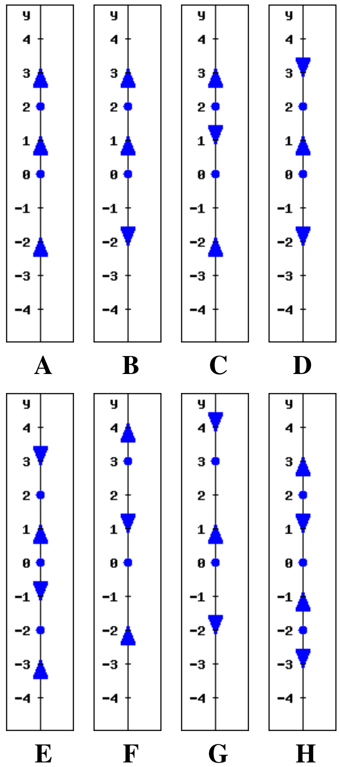
6. (1 point) `Library/FortLewis/DiffEq/1-First-order/06-Autonomous/BDH-1-6-37.pg`

Determine which differential equation corresponds to each phase line. You should be able to state briefly how you know your choices are correct.

$\boxed{?}$ 1. $\frac{dy}{dt} = y^2|y-2|$
$\boxed{?}$ 2. $\frac{dy}{dt} = y(2-y)^2$
$\boxed{?}$ 3. $\frac{dy}{dt} = 4y - y^3$
$\boxed{?}$ 4. $\frac{dy}{dt} = y(y-2)$
$\boxed{?}$ 5. $\frac{dy}{dt} = y^2 - 3y$
$\boxed{?}$ 6. $\frac{dy}{dt} = 3y - y^2$
$\boxed{?}$ 7. $\frac{dy}{dt} = 2y - y^2$
$\boxed{?}$ 8. $\frac{dy}{dt} = y^3 - 4y$



7. **(1 point)** `Library/FortLewis/DiffEq/1-First-order/06-Autonomous/BDH-1-7-01.pg`

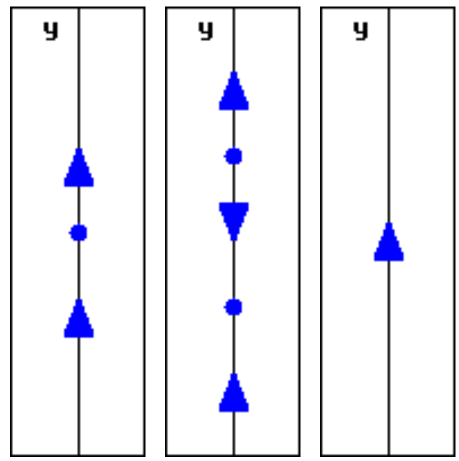
Determine the bifurcation value(s) for the one-parameter family

$$\frac{dy}{dt} = y^2 + k.$$

$k =$ __________ help (numbers)

Determine which differential equation corresponds to each phase line. You should be able to state briefly how you know your choices are correct.

[?] 1. k larger than the bifurcation value
[?] 2. k equal to the bifurcation value
[?] 3. k smaller than the bifurcation value



A B C