MTH 211 Test 2
Fall 2021

Ordinary Differential Equations

Name _____

When finished submit your answers by following the appropriate link on ***my Assignments page****.*
If you feel the answer is none of the choices given, submit no answer to the question.

1. The function $y(t) = c_1 e^{-2t} + c_2 t e^{-2t}$ is a general solution of

A. $y'' + 2y' + y = 0$

B. $y'' + 3y' + 2y = 0$

C. $y'' + 4y' + 4y = 0$

D. $y'' + 4y' + 4y = t$

2. Which of the following allows the general solution of an ordinary differential equation to be formed by adding a particular solution to the null solution.

A. Euler's Formula

B. Newton's Third Law of Motion

C. Superposition Principle

D. Differential Linearization

3. In using the method of undetermined coefficients to solve $y'' + y' - 2y = 15e^t + t^2$, why would a guess of $y_p(t) = Ae^t + Bt^2 + Ct + D$ not work?

4. If $y_1(t) = t\sin t$ and $y_2(t) = \sin t$, what would be the value of the Wronksian, $W(y_1, y_2)$?

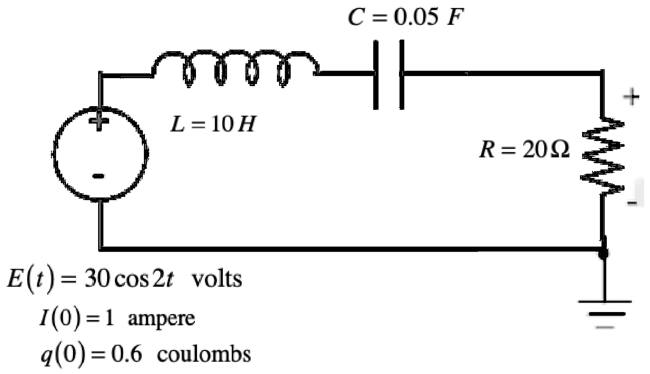
5. Given the following *RLC* single loop circuit, and finding the particular solution for the current as a function of time, using the method of undetermined coefficients, what would be the values of the coefficients?

A. $-\frac{1}{60}$ and $\frac{1}{30}$

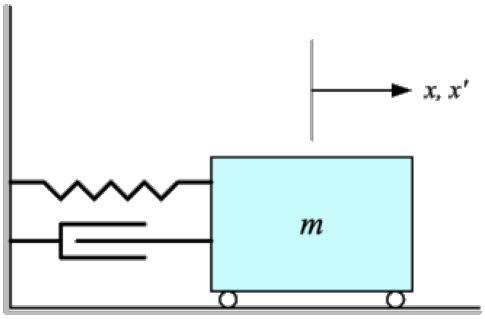
B. $-\frac{1}{5}$ and $-\frac{4}{5}$

C. -3 and 6

D. $\frac{3}{5}$ and $\frac{6}{5}$



6. Given the following spring-mass-dashpot system:

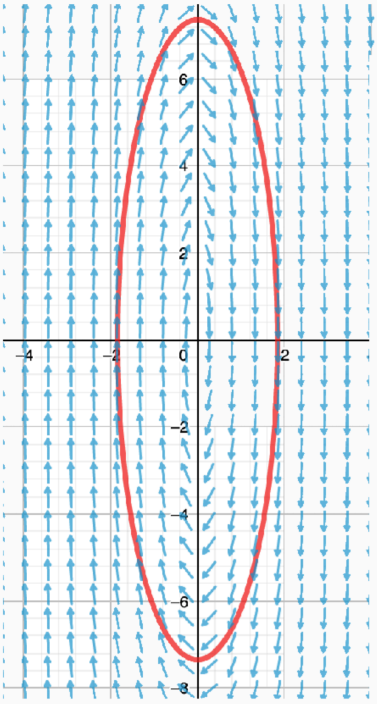


- weight $w = 320$ lb ,
- spring is stretched $\frac{32}{25}$ ft by w,
- damping coefficient $c = 60$ slug/ft-sec .
- Initial conditions:

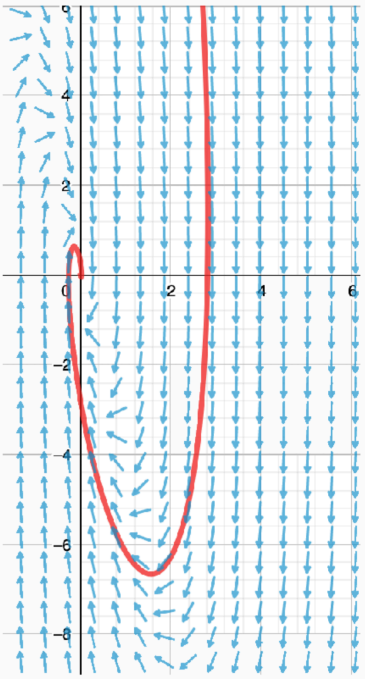
$x(0) = 0.3$ ft and $x'(0) = -0.1$ ft/sec.

Which of the following phase-plane diagrams describe the system?

A.



C.



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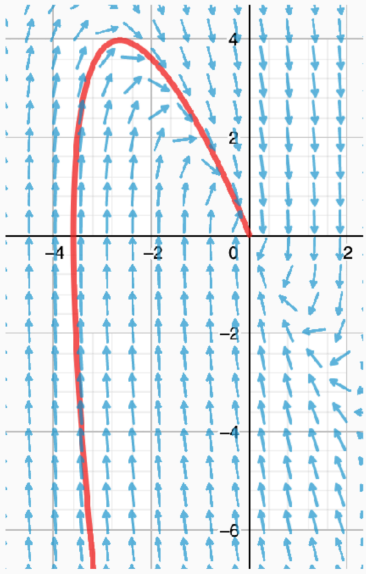

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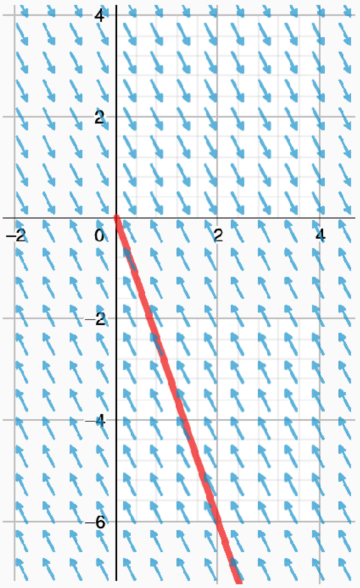
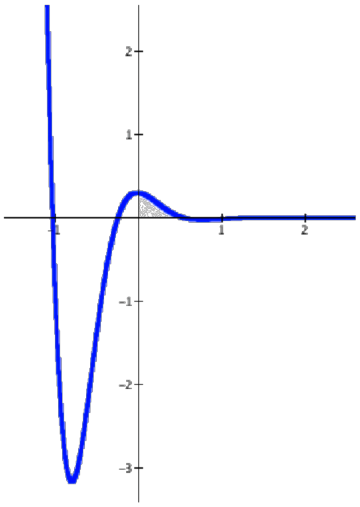


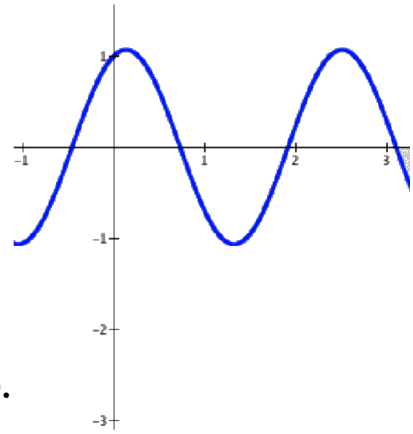
7. If, in the preceding problem, we are to investigate the coordinate point $\langle x, y \rangle$. What respectively would the *x*-coordinate **and** the *y*-coordinate tell us?

8. Which of the following describes the solution to $y'' + 7y = 0$?

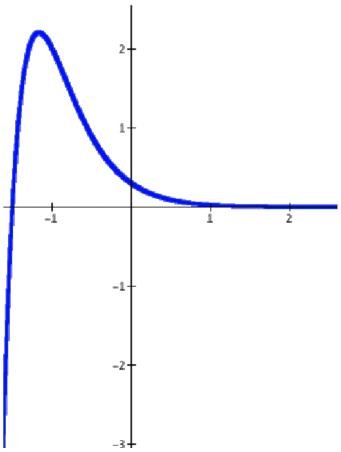
A.



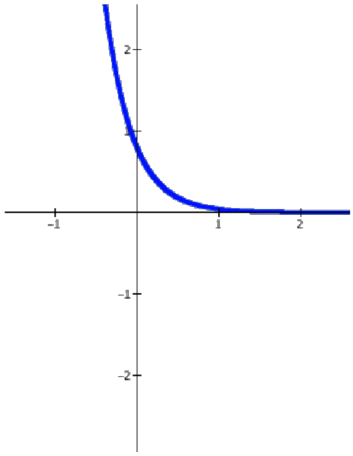
C.



B.



D.



9. The characteristic equation related to the fourth order differential equation $y'''' + 5y''' + 6y'' - 4y' - 8y = 0$ is $(s-1)(s+2)^3 = 0$. The solution, $y_n(t) =$?

- Given the initial value problem $y'' + 2y' = 3 + 4\sin 2t, \quad y(0) = 1, y'(0) = 1$.

10. What is the null solution ? Express your answer an expression - $c_1 y_1(t) + c_2 y_2(t)$.

11. Using variation of parameters, and integration by parts, the second integral results in $\frac{1}{2}\cos 2t - \frac{1}{2}\sin 2t - \frac{3}{4}$. What would be the result for the first integral?

12. What are the values of c_1 and c_2 respectively ?