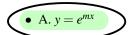
Assignment Math45-Module-12-Exercises due 10/29/2020 at 11:59pm PDT

Q

1 Following the method performed in the videos, to solve the differential equation 7y'' + 7y' + 4y = 0 we would first plug in which of the following functions?



- B. $y = x^m$
- C. $y = 7x^2 + 7x + 4$
- D. $y = \cos(mx)$
- E. $y = \sin(mx)$

Following the method performed in the videos to solve 6y'' + 2y' + 7y = 0, we seek find the *m* satisfying which of the following expressions?

- B. $5m^2 + 6m + 7 = 0$
- C. m = 6
- D. (m-6)(m-2) = 0

Q 3. (1 point) Mark all of the possibilities that can arise when solving a quadratic equation as in the method of solving order 2 homogeneous linear differential equations.

- A. One repeated real root.
 - B. No roots.

Q3

- C. Two complex roots.
- D. One complex root.
- E. One real root and one complex root.
- F. Two distinct real roots.
- G. None of the above

Consider the differential equation y'' + 10y' + 34y = 0. Note that the methods described in the videos give rise to the two values $m_1 = 5 + i3$ and $m_2 = 5 - i3$. Which of the following is the general solution to the differential equation?

• A.
$$y = c_1 e^{5x} \cos(3x) + c_2 e^{5x} \sin(3x)$$

- B. $y = c_1 e^{5x} + c_2 e^{3x}$
- C. $y = c_1 e^{(5+i3)x} + c_2 x e^{(5+i3)x}$
- D. $y = ce^{5x} (\cos(3x) + \sin(3x))$

 \bigcirc 5. (1 point) Find the general solution to 5y'' + 5y' - 10y = 0. Enter your answer as $y = \dots$. In your answer, use c_1 and c_2 to denote arbitrary constants and x the independent variable. Enter c_1 as c_1 and c_2 as c_2 .

$$\underline{Y} = C_1 e^x + C_2 e^{-2x}$$
 help (equations)

Q6. (1 point) The general solution to the second-order differential equation 9y'' + 24y' + 16y = 0 is in the form $y(x) = c_1e^{rx} + c_2xe^{rx}$. Find the value of r.

Answer:
$$r = -4/3$$

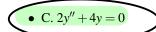
Q7. (1 point) Mark all of the differential equations below that are homogeneous linear differential equations with constant coefficients.

• A.
$$6y'' + 9y' + 9y = 0$$

1



• B. $7y'' + 4y' + 9y = 4x^2$



• D.
$$7y'' + 9y' + 4y = 0$$

• E.
$$9y'' + 6y' = 0$$

• F.
$$4y'' + 4y' + 9y = 0$$

• G.
$$6y'' + 9y' + 9y = e^{4x}$$

• H. None of the above

Which of the followins is the solution to the differential equation $y^{(4)} - 24y''' + 206y'' - 744y' + 945y = 0$? (You may use



something like WolframAlpha to find the roots of the polynomial!)

• A.
$$y = c_1 e^{3x} \left(\cos(5x) + c_2 e^{3x} \sin(5x) + c_3 e^{7x} + c_4 e^{9x}\right)$$

• B.
$$y = c_1 e^{3x} + c_2 e^{5x} + c_3 e^{7x} + c_4 e^{9x}$$

• C.
$$y = c_1 e^{3x} + c_2 e^{5x} + c_3 x^2 e^{7x} + c_4 x^3 e^{7x}$$

• D.
$$y = c_1 e^{3x} + c_2 x e^{3x} + c_3 x^2 e^{3x} + c_4 x^3 e^{3x}$$

9. (1 point) Enter a value for π

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Question 5

5y" +5y'-10Y=0

Plug into DE; Y'=memx Gives 5m2enx+5memx-10emx=0

Factoring out emx

 $e^{Mk}(5m^2+5m-10)=0$ $\neq 0$ \Rightarrow must have equal zero!

 $5m^2 + 5m - 10 = 0$ Solve for "m"

$$y_{1} = e^{\left(\frac{-b + (b^{2} - 4ac}{2a}\right)x}$$

$$= e^{\left(\frac{-5 + (5^{2} - 45i0)}{2(5)}x\right)} = e^{\left(\frac{-5 - (5^{2} - 45i0)}{2(5)}x\right)} = e^{\left(\frac{-5 - 15}{1a}\right)x} = e^{\left(\frac{-5 - 15}{1a}\right)x}$$

$$Y = C_1 e^{x} + C_2 e^{-2x}$$

QUESTIN

Auxiliary equation corresponding to the given homogeneous differential equation is

$$9r^2 + 24r + 16 = 1$$

$$\Rightarrow (3r+4)^2 = 0$$

$$\Rightarrow r = -\frac{4}{2}, -\frac{4}{2}$$

General solution is $y_{s} = c_{s}e^{-\frac{4}{3}z} + c_{s}xe^{-\frac{4}{3}z}$

Therefore
$$r = -\frac{4}{3}$$