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1. (1 point) Mark all of the following which are Cauchy-Euler equations.

- A. $\pi^7 x^4 y^{(4)} + 4xy' + 5y = 0$
- B. $x^5 y^{(5)} + 4x^3 y''' + 7y = 0$
- C. $4x^2 y'' + 7xy' + 5y = e^x$
- D. $4x^2 y'' + 7xy' + 5y = 0$
- E. $x^3 y^{(5)} + 4x^3 y''' + 7y = 0$
- F. $5x^3 \dfrac{d^3}{dx^3} + 7x^5 y'' - 4y = 0$
- G. $\pi^7 x^4 y^{(4)} + 4xe^x y' + 5y = 0$
- H. $5x^3 \dfrac{d^3}{dx^3} + 7x^2 y'' - 4y = 0$
- I. None of the above

Following the method performed in the videos, to solve the differential equation $8x^2 y'' + 9xy' + 7y = 0$ we would first plug in which of the following functions?

- A. $y = \sin(mx)$
- B. $y = 8x^2 + 9x + 7$
- C. $y = x^m$
- D. $y = e^{mx}$
- E. $y = \cos(mx)$

Following the method performed in the videos to solve $8x^2 y'' + 8xy' + 3y = 0$, we seek find the m satisfying which of the following expressions?

- A. $8m^2 + 8m + 3 = 0$
- B. $m = 8$
- C. $8m^2 + 8m + 3 = 0$
- D. $8m^2 + 0m + 3 = 0$
- E. $(m-8)(m-8) = 0$

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4. (1 point) Mark all of the possibilities that can arise when solving a quadratic equation as in the method of solving order 2 Cauchy-Euler equations.

- A. Two distinct real roots.
- B. Two complex roots.
- C. One complex root.
- D. One repeated real root.
- E. One real root and one complex root.
- F. No roots.
- G. None of the above

Consider the differential equation $x^2y'' + 4xy' + 29y = 0$. Note that the methods described in the videos give rise to the two values $m_1 = 2 + i5$ and $m_2 = 2 - i5$. Which of the following is the general solution to the differential equation?

- A. $y = cx^2\left(\cos(5\ln|x|) + \sin(5\ln|x|)\right)$
- B. $y = c_1x^2\cos(5\ln|x|) + c_2x^2\sin(5\ln|x|)$
- C. $y = c_1e^{(2+i5)x} + c_2xe^{(2+i5)x}$
- D. $y = c_1e^{2x} + c_2e^{5x}$

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6. (1 point) The general solution to the second-order differential equation $49x^2y'' + 77xy' + 4y = 0$ is in the form $y(x) = c_1x^r + c_2x^r\ln|x|$. Find the value of r.

Answer: $r =$ __________