

SPRING 2022

Assignment #2

Total: 5 marks

PHM212s: Special Functions, Complex Analysis & Numerical Analysis

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1/11

Name:

ID:

Deadline: Week 6

Please, Solve each problem in its assigned place ONLY (the empty space below it)

Series Solutions for Linear Differential Equations

Find series solutions in powers of 'x 'for the following differential equations:

1. $y'' - 2xy' - 6y = 0$

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2. $x^2 y'' + x y' + (x^2 - \frac{1}{4})y = 0$

3. $x y'' - x y' - y = 0$

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4. $(1 - x^2) y'' - 4 x y' + 4y = 0$

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5. $4x y'' + 2y' + y = 0$

6. $(3 - x^2) y'' - x y' + 25 y = 0$

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7. $(x^4 - x^2) y'' + 2 x^3 y' + 6 y = 0$

8. $x y'' + (1 + x) y' + 2 y = 0$

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9. $x y'' + y' + y = 0$

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10. $(1 - x^2) y'' - 2 x y' + 2y = 0$

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11. $(x - x^2) y'' + (1 - 5x) y' - 4y = 0$

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12. $(x - x^3) y'' + 3 (1 - x^2) y' + 8 x y = 0$

13. $x^2 y'' + x y' + (x^2 - 1) y = 0$

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14. $x(1-x)y'' - 3xy' - y = 0$

15. $xy'' - y = 0$

*Best wishes,
Dr. Makram Roshdy*