

Section 7.2 — Problem A

15 Points

Solve the following IVP using power series:

$$(x^2 - 4)y'' - xy' - 3y = 0, \quad y(0) = -1, \quad y'(0) = 2.$$

Section 7.2 — Problem B

10 Points

Solve the following IVP using power series:

$$y'' + (x - 3)y' + 3y = 0, \quad y(3) = -2, \quad y'(3) = 3,$$

given that the general solution to

$$y''(t) + ty' + 3y(t) = 0$$

is

$$y(t) = a_0 + a_1 t - \frac{3}{2}a_0 t^2 - \frac{2}{3}a_1 t^3 + \frac{5}{8}a_0 t^4 + \frac{3}{10}a_1 t^5 - \frac{7}{48}a_0 t^6 - \frac{2}{35}a_1 t^7 + \cdots.$$

Section 8.1 — Problem C

25 Points

Find the Laplace transform of the following functions (you can use the table)

1) $\cosh(t) \sin(t)$.

4) $\sin(2t) + \cos(4t)$.

2) $\cosh^2(t)$.

5) $\sin(2t) \cos(3t)$.

3) $t \sinh(2t)$.

TOTAL (POINTS): 50.