

### Homework 3 (Due: 12/13)

(1) Solve the following DE by the power series about the ordinary point  $x = 0$

$$y'' + x^2y' + xy = 0$$

(2) Solve the following DE by the power series about the ordinary point  $x = 0$

$$y'' + e^xy' - y = 0$$

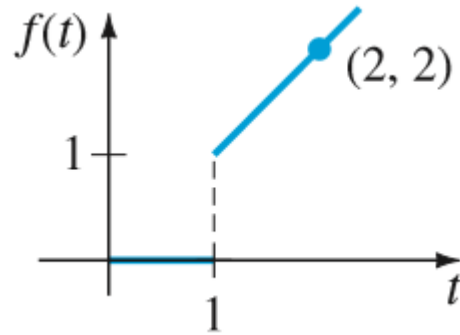
(3) Solve the following DE by the power series about the regular singular point  $x = 0$  by Frobenius' method

$$2xy'' - (3 + 2x)y' + y = 0$$

(4) Solve the following DE by the power series about the regular singular point  $x = 0$  by Frobenius' method (the method of Section 4.2 may or may not be used)

$$xy'' + 2y' - xy = 0$$

(5) Find the Laplace transform of the following function



(6) Determine the following inverse Laplace transform

$$\mathcal{L}^{-1}\left\{\frac{1}{s^4 - 9}\right\}$$

(7) Solve the following DE by the Laplace transform

$$y''' + 2y'' - y' - 2y = \sin 3t, \quad y(0) = 0, \quad y'(0) = 0, \\ y''(0) = 1$$

(8) Determine the following inverse Laplace transform

$$\mathcal{L}^{-1}\left\{\frac{se^{-\pi s/2}}{s^2 + 4}\right\}$$

(9) Solve the following DE by the Laplace transform

$$y'' + 4y = \sin t \mathcal{U}(t - 2\pi), \quad y(0) = 1, y'(0) = 0$$

(10) Evaluate the following Laplace transform

$$\mathcal{L}\{te^{2t} \sin 6t\}$$