

## 3450:335 Ordinary Differential Equations, Kreider

Name: \_\_\_\_\_

Quiz 7, Section 4.3, due on \_\_\_\_\_

(10 pts) Solve the initial value problem  $4y''(x) - 4y'(x) - 3y(x) = 0$ , with  $y(0) = 2$ ,  $y'(0) = -3$ .

$$4m^2 - 4m - 3 = 0$$

$$(2m-3)(2m+1) = 0 \quad \text{so } m = \frac{3}{2}, -\frac{1}{2}$$

$$\text{or } m = \frac{4 \pm \sqrt{16 - 4 \cdot 4 \cdot (-3)}}{8} = \frac{4 \pm \sqrt{64}}{8} = \frac{4 \pm 8}{8}$$

$$y = c_1 e^{\frac{3}{2}x} + c_2 e^{-\frac{1}{2}x}$$

$$y' = \frac{3}{2}c_1 e^{\frac{3}{2}x} - \frac{1}{2}c_2 e^{-\frac{1}{2}x}$$

$$2 = y(0) = c_1 + c_2$$

$$-3 = y'(0) = \frac{3}{2}c_1 - \frac{1}{2}c_2$$

$$2 = c_1 + c_2$$

$$-6 = 3c_1 - c_2$$

$$\text{add: } -4 = 4c_1 \quad c_1 = -1$$

$$2 = c_1 + c_2$$

$$\text{so } c_2 = 3$$

$$y = -e^{\frac{3}{2}x} + 3e^{-\frac{1}{2}x}$$