

Math 3280 Worksheet 28:

Group members (2 to 4): \_\_\_\_\_

- (1) Rewrite the initial value problem  $y(0) = y'(0) = y''(0) = 0$ ,  $y''' + y'' - xy' = \cos(x)$  as an equivalent first-order system.

- (2) A critically damped hotel door, initially open at an angle of  $\theta(0) = \pi/2$ , is pushed shut with an initial velocity of  $\theta'(0) = v_0 < 0$ . For what values of  $v_0$  will the door actually close completely in finite time if the angle  $\theta$  satisfies the ODE

$$\theta'' + 2\theta' + \theta = 0$$

for  $\theta \geq 0$ ?