

MATH 202 Quiz # 2

Name: Solution Sr# \_\_\_\_\_ Section \_\_\_\_\_

1. Solve

$$(x+d_8)y' - 2y = d_7(x+d_8)^3 e^x, \text{ where } d_i = \begin{cases} i^{\text{th}} \text{ digit in your ID\# if } d_i \neq 0 \\ 1 + i^{\text{th}} \text{ digit in your ID\# if } d_i = 0 \end{cases}$$

$$y' - \frac{2}{(x+d_8)} y = d_7 (x+d_8)^2 e^x \quad \text{--- (*) [Linear]}$$

The integrating factor  $\mu = e^{\int \frac{-2}{(x+d_8)} dx} = e^{-2 \ln|x+d_8|} = (x+d_8)^{-2}$

Multiplying both sides of (\*) by  $(x+d_8)^{-2}$ ,

$$\frac{d}{dx} [y (x+d_8)^{-2}] = d_7 e^x$$

$$y(x+d_8)^{-2} = \int d_7 e^x dx$$

$$y(x+d_8)^{-2} = d_7 e^x + c$$

$$y = (x+d_8)^2 (d_7 e^x + c)$$

2. Solve the following initial value problem:  $y' = y \cos x - xy$ ,  $y(0) = 1$

$$\frac{dy}{dx} = y(\cos x - x)$$

$$\frac{dy}{y} = (\cos x - x) dx$$

$$\int \frac{dy}{y} = \int (\cos x - x) dx$$

$$\ln|y| = \sin x - \frac{x^2}{2} + C_1$$

$$y = C e^{\sin x - \frac{x^2}{2}}$$

$$y(0) = 1 \Rightarrow C = 1$$

The solution is

$$y = e^{\sin x - \frac{x^2}{2}}$$