MATH 202 Quiz # 2

Name: Solution Sr#________ Section ______

1. Solve

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

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

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 $(x+d_8)^{-2}$,

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

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

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

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

2. Solve the initial value problem:

$$\frac{dz}{dy} = 1 + y + z + yz \qquad\qquad z(0) = 0$$

$$\frac{dz}{dy} = 1 + y + z(1+y)$$

$$= (1+y)(1+z)$$

$$\frac{dz}{1+z} = (1+y)\,dy$$

$$\int \qquad = \int$$

$$\ln|1+z| = y + \tfrac{1}{2}y^2 + C_1$$

$$|1+z| = e^{y+\frac{1}{2}y^2+C_1}$$

$$1+z = C\,e^{y+\frac{1}{2}y^2}, \qquad C = \pm e^{C_1}$$

$$z = C\,e^{y+\frac{1}{2}y^2} - 1$$

$$y(0) = 0 \Rightarrow 0 = C - 1 \Rightarrow \boxed{C=1}$$

The solution is: $z = e^{y+\frac{1}{2}y^2} - 1$