MATH 202 Quiz # 2

Name: Solution __________ Sr#__________ Section ______

1. Solve

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

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

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: $y' = x\sqrt{x^2+5}$, $y(-2) = 6$

$$\frac{dy}{dx} = x(x^2+5)^{\frac{1}{2}}$$

$$y = \int x(x^2+5)^{\frac{1}{2}}\,dx$$

$$= \frac{1}{3}(x^2+5)^{\frac{3}{2}} + C$$

$y(-2) = 6 \Rightarrow \frac{1}{3}(27) + C = 6 \Rightarrow C = -3$

Hence, the solution is

$$y = \frac{1}{3}(x^2+5)^{\frac{3}{2}} - 3$$