MATH 242 - Quiz 10

04/25/2024

1. [**4 pts**] Find the general solution of the differential equation.

$$e^{-y}y' + \cos(x) = 0$$

$$\int e^{-y}\,dy = \int -\cos(x)\,dx$$

$$-e^{-y} = (-\sin(x)$$

$$e^{-y} = (+\sin(x)$$

$$-y = \ln((+\sin(x))$$

$$y = -\ln((+\sin(x))$$

$$= \ln\left(\frac{1}{(+\sin(x)}\right)$$

2. **[6 pts]** Find the general solution of the differential equation.

$$y' + \frac{xy}{2} = 2x$$

$$e^{\int P(x)} = e^{\int \frac{x}{2}} = e^{\frac{x^2}{4}}$$

$$e^{\frac{x^2}{4}} y' + \frac{x}{2} e^{\frac{x^2}{4}} y = 2x e^{\frac{x^2}{4}}$$

$$\int \frac{d}{dx}\left[e^{x^2/4} y\right] dx = \int 2x e^{x^2/4} dx$$

$$e^{x^2/4} y = 4e^{x^2/4} + C$$

$$y = 4 + \frac{C}{e^{x^2/4}}$$

$$= 4 + Ce^{-x^2/4}$$