a)

$$\frac{d^n y}{dx} = \frac{1}{3}e^x$$

$$4y'' - y = e^x$$

$$\boxed{\frac{4}{3}e^x - \frac{1}{3}e^x = e^x} \checkmark$$

b)

$$\frac{dy}{dx} = -\frac{1}{x^2}$$

$$\frac{d^2 y}{dx} = \frac{2}{x^3}$$

$$x^2\frac{d^2 y}{dx} + 3x\frac{dy}{dx} + y = 0$$

$$\boxed{\frac{2}{x} - \frac{3}{x} + \frac{1}{x} = 0} \checkmark$$