

$$y(0) = 1$$

$$2.4 \quad \#22 \quad (e^x + y) dx + (2 + x + ye^y) dy = 0$$

M N

$$\frac{\partial M}{\partial y} = 1$$

$$\frac{\partial N}{\partial x} = 1$$

$$\frac{\partial \psi}{\partial x} = e^x + y$$

$$\psi = e^x + xy + g(y)$$

$$\frac{\partial \psi}{\partial y} = 0 + x + g'(y) = 2 + x + ye^y$$

$$g'(y) = 2 + ye^y \quad \text{Int by parts}$$

$$g(y) = 2y + \int ye^y dy = 2y + (y-1)e^y$$

$$\boxed{e^x + xy + 2y + (y-1)e^y = C}$$

$$y(0) = 1$$

$$e^0 + 0 + 2 + 0 = C$$

$$\boxed{C = 3}$$