1.

b) $3xy + (x-3)y' = 0$

$(x-3)y' = -3xy$

$y' = \frac{-3xy}{x-3}$

$= \left(\frac{-3x}{x-3}\right) y$

$\therefore$ Separable

3. $2xy + 6x + (x^2-4)y' = 0$

$y' = -\frac{2xy - 6x}{x^2-4}$

$= \frac{-x(2y-6)}{x^2-4}$

$= \frac{-x}{x^2-4} \cdot (2y-6)$

$\therefore$ Separable

$\frac{dy}{dx} = \frac{-2x}{x^2-4}(y+3)$

$\frac{1}{y+3}\,dy = \frac{-2x}{x^2-4}\,dx$

$\int \frac{1}{y-3}\,dy = \int \frac{-2x}{x^2-4}\,dx$

$\ln|y-3| = \int \frac{-2u}{x^2-4}\,dx$

$\ln|y-3| = -\ln|x^2-4| + C$

$\ln|(y-3)(x^2-4)| = C$

$\ln|(y+3)(x^2-4)| = C$

$$(y+3)(x^2-4) = e^c$$

$$y+3 = \frac{c}{x^2-4}$$

$$y = \frac{c}{x^2-4} - 3$$

4. $(e^{2y}-y)\cos x \frac{dy}{dx} = e^y \sin 2x$

$$\frac{e^{2y}-y}{e^y}\,dy = \frac{\sin 2x}{\cos x}\,dx$$

$$e^y - ye^{-y}\,dy = \frac{2\sin x \cancel{\cos x}}{\cancel{\cos x}}\,dx$$

$$\int (e^y - ye^{-y})\,dy = 2\int \sin x\,dx$$

$$e^y - [-ye^{-y} - e^{-y}] = -2\cos x + c$$

$$e^y + ye^{-y} + e^{-y} = -2\cos x + c$$

$\int ye^{-y}\,dy$

d/dx	∫ dx
y	e^{-y}
1	$-e^{-y}$
0	e^{-y}

@ $x=0$, $y=0$

$$1+0+1 = -2(1)+c$$

$$2 = -2+c$$

$$c = 4$$

General Solution

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