put $y = vx$ in $\frac{dy}{dx} = \frac{y\left(x\cos\frac{y}{x} + y\sin\frac{y}{x}\right)}{x\left(-x\cos\frac{y}{x} + y\sin\frac{y}{x}\right)}$

$\left\{\frac{dy}{dx} = v + x\frac{dv}{dx}\right\}$

Thus

$$\Rightarrow v + x\frac{dv}{dx} = \frac{vx\left(x\cos\left(\frac{vx}{x}\right) + vx\sin\left(\frac{vx}{x}\right)\right)}{x\left(-x\cos\left(\frac{vx}{x}\right) + vx\sin\left(\frac{vx}{x}\right)\right)}$$

$$= \frac{vx^2(\cos v + v\sin v)}{x^2(-\cos v + v\sin v)}$$

$$= \frac{v(\cos v + v\sin v)}{(-\cos v + v\sin v)}$$