$f = f(t)$, $f y' + t^2 + y = 0$

$u(t) = t$

$$f(t)\, y'(t) + t^2 + y(t) = 0$$

$$y' + \frac{y}{f} = -\frac{t^2}{f}$$

$$p(t) = \frac{1}{f}, \quad q(t) = -\frac{t^2}{f(t)}$$

$$t = u(t) = e^{\int p(t)\,dt} = e^{\int \frac{1}{f}\,dt}$$

$$\log t = \int \frac{1}{f}\,dt$$

$$\frac{1}{t} = \frac{1}{f}$$

$$f(t) = t$$

$\Longleftarrow$