(3) $(5x+4y)\partial x + (4x-8y^3)dy = 0$

$M(x,y) = 5x+4y$ y $N(x,y) = 4x-8y^3$

Luego

$$\frac{\partial M}{\partial y} = 4 = \frac{\partial N}{\partial x}$$

Por definición $\exists f(x,y)$ /

$$\frac{\partial f}{\partial x} = M(x,y) \quad y \quad \frac{\partial f}{\partial y} = N(x,y)$$

$$\frac{\partial f}{\partial x} = 5x+4y$$

- $\int \partial f = \int (5x+4y)\partial x$

$$f(x,y) = \frac{5x^2}{2} + 4yx + g(y) \quad \dots (1)$$

- $\frac{\partial f}{\partial y} = 4x - 8y^3$

$$4x + \frac{\partial g}{\partial y} = 4x - 8y^3$$

$$\int \partial g = \int -8y^3 dy$$

$$g(y) = -2y^4 \quad \dots (2)$$

Luego

$$f(x,y)=C$$

de ① y ②

$$\frac{5x^2}{2}+4xy-2y^4=C$$

(solución implícita)

10 $(x^3+y^3)dx+3xy^2dy=0$

$M(x,y)=x^3+y^3$ y $N(x,y)=3xy^2$

$\exists\, f(x,y)$ tal que

$$\frac{\partial f}{\partial x}=M(x,y) \quad y \quad \frac{\partial f}{\partial y}=N(x,y)$$

$$\rightarrow \frac{\partial f}{\partial x}=x^3+y^3$$

$$\int \partial f=\int (x^3+y^3)dx$$

$$f(x,y)=\frac{x^4}{4}+y^3x+g(y) \quad \ldots \quad ①$$

$\rightarrow \frac{\partial f}{\partial y} = 3xy^2 \rightarrow 3y^2x + \frac{\partial g}{\partial y} = 3xy^2$

$$\frac{\partial g}{\partial y} = 0$$

$$\int \partial g = \int 0 \, dy$$

$$g(y) = 0 \quad \ldots \quad 2$$

Luego

$$f(x,y) = C$$

y de 1 y 2

$$\frac{x^4}{4} + y^3x + 0 = C$$

<u>SOL</u> $\frac{x^4}{4} + y^3x = C$

21) $(x+y)^2 dx + (2xy + x^2 - 1)dy = 0 \;, y(1) = 1$

Ecuación de la forma

$$M(x,y) + N(x,y) = 0$$

$$\to \frac{\partial M}{\partial y} = 2(x+y) = \frac{\partial N}{\partial x} \quad \ldots \text{ Ecuación exacta.}$$

ahora por definición $\exists$

$f(x,y) \;/:$

$$\frac{\partial f}{\partial x} = M(x,y) \quad y \quad \frac{\partial f}{\partial y} = N(x,y)$$

$$\to \frac{\partial f}{\partial x} = (x+y)^2$$

$$\int \partial f = \int (x+y^2)^2 dx \to f(x,y) = \frac{(x+y)^3}{3} + g(y)$$

(1)

$$\to \frac{\partial f}{\partial y} = 2xy + x^2 - 1$$

$$(x+y)^2 + \frac{\partial g}{\partial y} = 2xy + x^2 - 1$$

$$\cancel{x^2} + y^2 + \cancel{2xy} + \frac{\partial g}{\partial y} = \cancel{2xy} + \cancel{x^2} - 1$$

$$\frac{\partial g}{\partial y} = -1 - y^2$$

$$\int \partial g = -\int (1 + y^2)\, dy$$

$$g(y) = -y - \frac{y^3}{3} \cdots 2$$

Luego $f(x,y) = c$

de 1 y 2

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

$$\frac{(x+y)^3}{3} \frac{-3y - y^3}{3} = c$$

$$\frac{(x+y)^3 - y^3 - 3y}{3} = c$$

Luego

$$\frac{(1+1)^3 - 1^3 - 3(1)}{3} = c$$

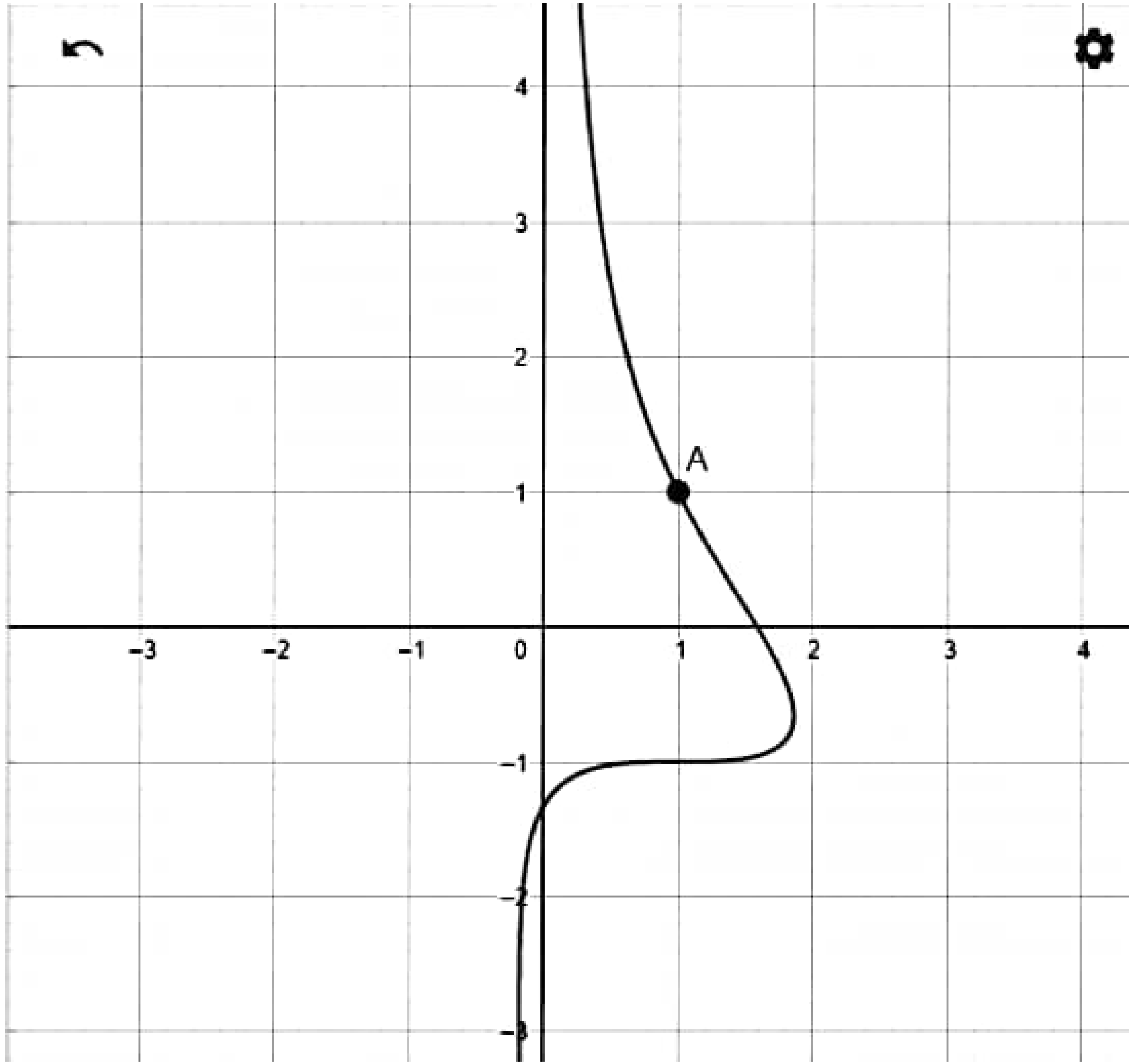
$$c = \frac{4}{3}$$

Sol $(x+y)^3 - y^3 - 3y = 4$

eq1: $(x + y)^3 - y^3 - 3y = 4$

$A = (1, 1)$

+ Input...



(23)

$(4y+2t-5)dt+(6y+4t-1)dy=0 \quad y(-1)=2$

Ecuación de la forma

$$M(t,y)+N(t,y)=0$$

$\to$

$\to M(t,y)=(4y+2t-5)$

$N(t,y)=(6y+4t-1)$

Por def. $\exists$

$$f(t,y) \mid \frac{\partial f}{\partial t}=M(t,y) \text{ y } \frac{\partial f}{\partial y}=N(t,y)$$

Luego

$\to \dfrac{\partial f}{\partial t}=4y+2t-5 \to \int \partial f=\int(4y+2t-5)\,dt$

$f(t,y)=4yt+t^2-5t+g(y) \quad \ldots (1)$

$\to \dfrac{\partial f}{\partial y}=6y+4t-1$

$\cancel{4t}+\dfrac{\partial g}{\partial y}=6y+\cancel{4t}-1 \to \int \partial g=\int(6y-1)\,dy$

$g(y)=3y^2-y \quad \ldots (2)$

luego $f(t,y)=c$

de ① y ②

$4yt+t^2-5t+3y^2-y=c$

Reemplazando

$4(2)(-1)+(-1)^2-5(-1)+3(2)^2-2=c$

$c=24$

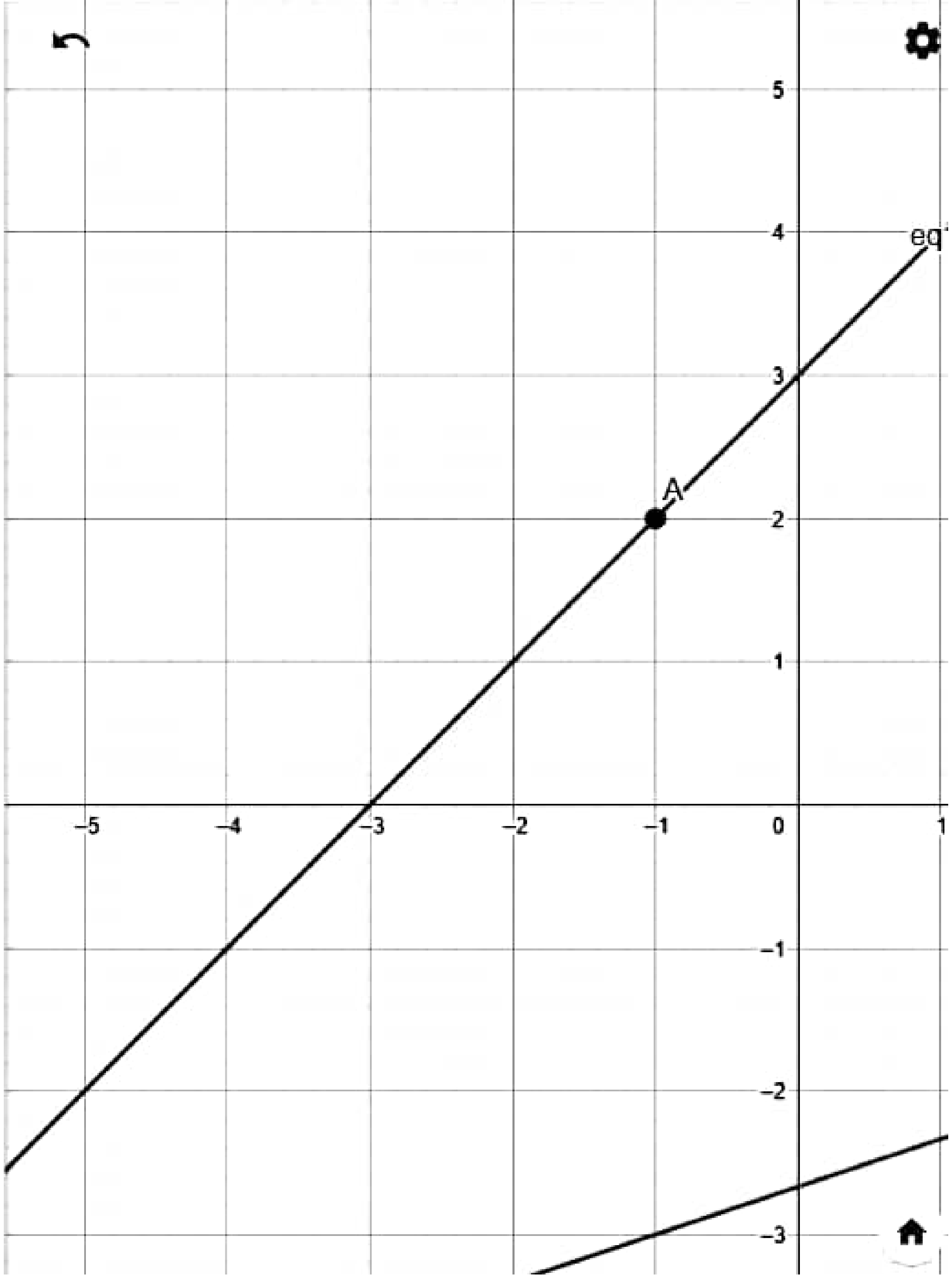
SOL

$t^2+3y^2-4yt-5t-y=24$

eq1: $x^2 + 3y^2 - 4x\,y - 5x - y = 24$

$A = (-1, 2)$

+ Input...



(15)

$T_i = 20°C$

¿Cuanto tiempo tardara la barra los 90°C si se sabe que su T aumento en 2°C en 1 segundo?

¿cuanto tiempo tardara alcanzar 98°C?

$$\frac{dT}{dt} = K(T - T_m)$$

$$\frac{dT}{T - T_m} = K\,dt \rightarrow \int \frac{dT}{T - T_m} = \int K\,dt$$

$$\ln(T - T_m) = Kt + C$$

$$T - T_m = e^{Kt + C}$$

$$T(t) = C \cdot e^{Kt} + T_m$$

$$20 = C + 100$$

$$C = -80$$

$t = 1$

$$22 = -80e^{K} + 100$$

$$-78 = -80e^{K}$$

$$\rightarrow K = \ln(78/80)$$

Escaneado con CamScanner

① $90 = -80\, e^{\ln\left(\frac{78}{80}\right) t} + 100$

$$\frac{1}{8} = e^{\ln\left(\frac{78}{80}\right) t}$$

$$\ln(1/8) = \ln\left(\frac{78}{80}\right) t$$

$$t = 82.13$$

Alcanzara 90°C despues de 82.13 s

② $\ln\left(\frac{1}{40}\right) = \ln\left(\frac{78}{80}\right) t$

$$t = 145.70$$

Alcanzara 98°C despues de 145.7 seg

(29) Datos

$E(t) = 30v$ $\qquad i(0) = 0$

$L = 0.1$ henrys

$R = 50\ \Omega$

$$L\frac{di}{dt} + Ri = E(t)$$

$$0.1\frac{di}{dt} + 50i = 30$$

$$\underset{p(t)}{i' + 500 i} = \underset{f(t)}{300}$$

$$\mu(t) = e^{\int 500\,dt}$$

$$\mu(t) = e^{500t}$$

$$i(t) = \frac{1}{\mu t}\int p(t)\mu(t)\,dt$$

$$i(t) = \frac{1}{e^{500t}}\int e^{500t}\cdot 300\,dt$$

$$i(t) = \frac{1}{e^{500t}}\left(\frac{3e^{500t}}{5} + c\right)$$

$$i(t) = \frac{3}{5} + \frac{c}{e^{500t}}$$

Reemplazando en los valores iniciales

$$0 = \frac{3}{5} + \frac{c}{e^{0}}$$

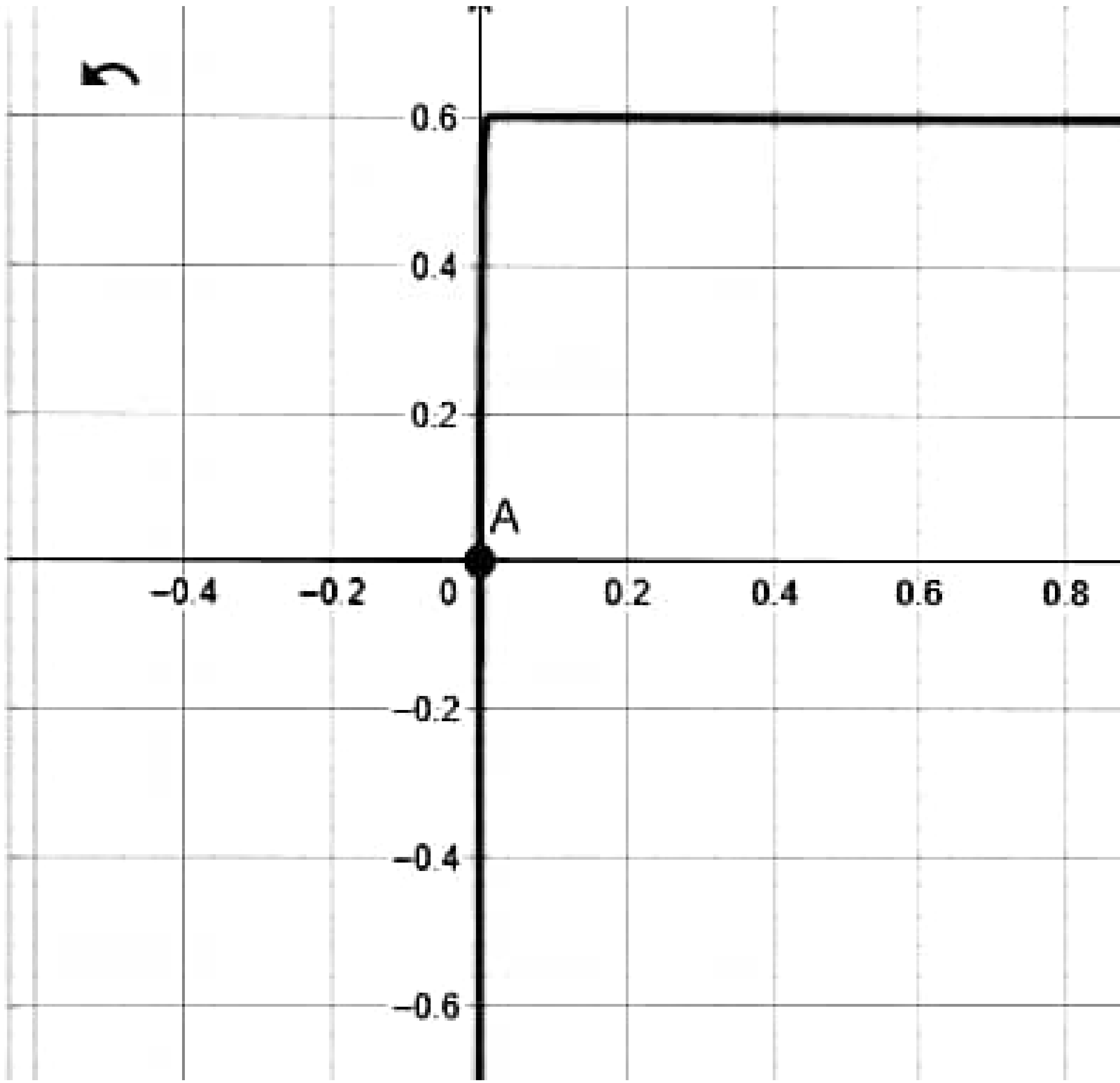
$$c = \frac{3}{5}$$

$$\therefore\ i(t) = \frac{3}{5} + \frac{3}{5e^{500t}}$$

$$f(x) = \frac{3}{5} - \frac{3}{5\,e^{500x}}$$

$A = (0, 0)$

\+ Input...



32 Sa aplica una Fuerza electromotris de 100 volts · aun circuito enserie RC en el que la resistencia es de 200 ohms y la capacitancia es de 10^{-4} farads determine la carga $g(t)$ del capacitor si $g(0)=0$ Encuentre la corriente $i(t)$

$E(t) = 100$ volts
$R = 200\,\Omega$
$C = 10^{-4}$ Farads

$$200\frac{dg}{dt} + \frac{1}{10^{-4}}g = 100$$

$$\frac{dg}{dt} + \underbrace{50}_{P(t)} g = \underbrace{0.5}_{f(t)}$$

$$\mu(t) = e^{\int 50\,dt}$$

$$\mu(t) = e^{50t}$$

$$\mu(t)g = \int \mu(t) f(t)\,dt$$

$$e^{50t}g = \int e^{50t}\,0.5\,dt$$

$$e^{50t}g = 0.5\frac{e^{50t}}{50} + C$$

$$g(t) = \frac{1}{100} + \frac{C}{e^{50t}}$$

~~g(t)~~

Evaluando en la condicion inicial

$$0 = \frac{1}{100} + \frac{C}{1} \rightarrow C = -\frac{1}{100} = -0.01$$

$$q(t) = 0.01 - \frac{0.01}{e^{50t}}$$

$$200i + \frac{1}{10^{-4}} q = 100$$

$$200i + \left(0.01 - \frac{0.01}{e^{50t}}\right)\frac{1}{10^{-4}} = 100$$

$$\cancel{200}i + \cancel{100} - \frac{\cancel{100}}{e^{50t}} = \cancel{100}$$

$$i = \frac{1}{e^{50t}}$$